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ABSTRACT

This guide, which is intended for classroom teachers, supervisors, and administrators throughout Alabama, contains the minimum required content (core program) for public school instruction in career awareness and technological literacy in grades 7-10. Presented first are the following: introduction examining the vision and goals of career awareness and technological literacy; key definitions; conceptual framework of Alabama's career awareness and technological literacy course of study; discussion of instruction-related elements of technology education programs; and directions for interpreting the minimum required content. Most of the guide consists of parallel lists of topics and content standards for each of the following occupational preparation programs included in Alabama's course of career awareness and technological literacy: information technologies (visual, audio); physical technologies (manufacturing, transportation, power, energy, construction); and bio-related technologies (related health care, plant and animal cultivation, waste management, human factors engineering, fuel and chemical production). Separate standards are provided for level I (grades 7-10) and level II (grades 8-10) programs. Appended are Alabama's diploma requirements and guidelines for local time requirements and homework. Contains 35 references. (MN)

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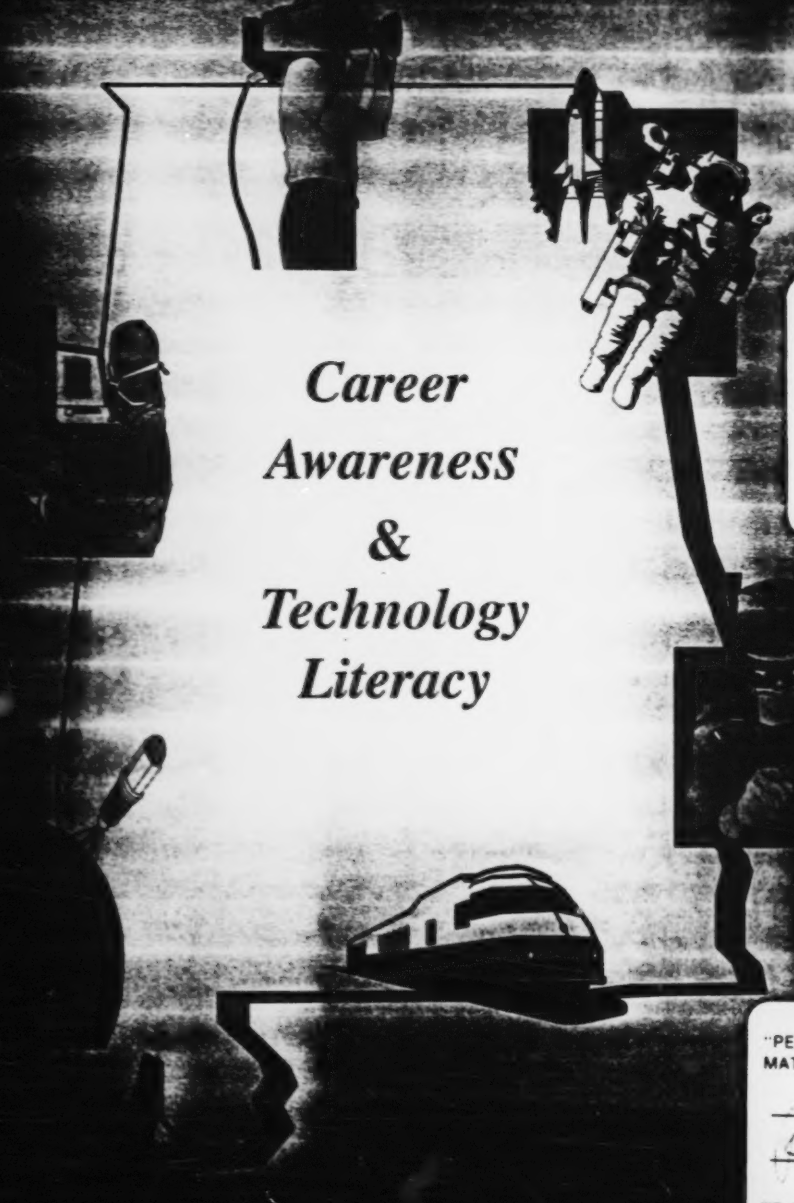
Alabama Course of Study
Technology Education



Career
Awareness
&
Technology
Literacy

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Alabama Course of Study

TECHNOLOGY EDUCATION

Ed Richardson
State Superintendent of Education
ALABAMA STATE DEPARTMENT OF EDUCATION
Montgomery, Alabama
Bulletin 1996, No. 20

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STATE OF ALABAMA
DEPARTMENT OF EDUCATION
ED RICHARDSON
STATE SUPERINTENDENT OF EDUCATION

July 1996

Dear Educator:

Vocational/Technical Education Curriculum is a vital part of the total education program. The course of study includes a complete range of technical skills and interpersonal skills. It incorporates higher-order thinking skills with academic skills to provide for the transition from secondary programs to postsecondary programs. The content of each vocational program emphasizes strong partnership with business and industry to provide for upward job mobility.

The course of study addresses the explosion of information and technological development that has necessitated change in curriculum development and instructional methodology. The **Alabama Course of Study** parallels national efforts to update vocational education to meet the emerging needs of the information age. It reflects a conscious decision to implement a vigorous, integrated, hands-on, minds-on approach for vocational instruction. This course of study serves as a cornerstone in the collaborative efforts among educators, parents, students, and business and technology leaders to provide opportunities for all Alabama students to become occupationally competent citizens.

Designed for use by classroom teachers, supervisors, and administrators to guide the development of local programs, this document contains the minimum required content (core program) for public school instruction in Grades 7-12 in vocational education. The State Board of Education, the Vocational Courses of Study Committee, and I sincerely believe that this Course of Study and instructional programs developed from it will equip future adult citizens with interpersonal and technical skills for life-long occupations.

Sincerely,

Ed Richardson
State Superintendent of Education

ER/jm

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Alabama Course of Study: Technology Education

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Preface

The *Alabama Course of Study: Technology Education* (Bulletin 1996, No.20) provides the framework for the Technology Education Program in Alabama's public schools. Content standards in this document are minimum and required (Ala. Code 16-35-4). They are fundamental and specific but not exhaustive. In developing local curriculum plans, school systems may include additional content standards to reflect local philosophies and may add implementation guidelines, resources, and/or activities that, by design, are not contained in this document.

The 1995-96 Technology Education Course of Study Committee extensively used guidelines from the states of Florida, Tennessee, Kentucky, and Virginia. A variety of professional journals and other publications about the latest technologies and national trends in Technology Education were also utilized. In addition to consultants from industry, members listened to recommendations from professionals within the field, used each member's academic and technical knowledge, and discussed issues among themselves and with colleagues. Finally, the committee members reached consensus and developed what they believe to be the best possible Technology Education Course of Study that will lead Alabama's students into the 21st century.

Acknowledgments

This document was developed by the Technology Education sub-committee of the 1995-96 Vocational Education State Courses of Study Committee that is composed of vocational classroom teachers; local school system vocational directors, supervisors, and other administrators; college educators appointed by the State Board of Education; and business and professional persons appointed by the Governor (Ala. Code §16-35-1). The Technology Education sub-committee began work in June 1995 and submitted its work to the State Board of Education for consideration in early 1996.

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The Committee extends appreciation to the **Morgan County Board of Education,** the **Jefferson County Board of Education,** and the **Lurleen B. Wallace Community College** for the use of their facilities in June for hosting the Vocational Education State Courses of Study Committee's Public Hearings.

Appreciation is extended also to **Dr. Issiah Ezell,** Alabama A&M University, and **Dr. James Selman,** Auburn University, who served as content reviewers of the document.

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Technology Literacy and Career Awareness: A Vision for Alabama's Technology Education Program

Mission Statement

Technology Education is an application-oriented discipline designed to explore technologies. This exploration includes concepts, practices, and careers associated with information technologies, physical technologies, and bio-related technologies in a problem-solving approach integrating technical, academic, and work-place knowledge skills that are essential in developing the human potential needed to compete in a technological society.

A Vision for Technology Education

The world is an ever-changing place. Advances in technology over the last generation have been phenomenal, and the future is expected to hold an even faster rate of technological changes. Throughout history, humans have been producers, builders, communicators, consumers, and travelers; however, through technology the manner in which these activities have been conducted has undergone rapid changes. Because of technology, humans can now engage in virtually instant worldwide communications, travel faster than the speed of sound, build structures, and produce valuable goods through a high degree of automation. Technology has truly changed the way we live. Yet, as technology development continues, it has become increasingly difficult for people to understand technology and its impact on humans, society, and the environment.

The school, with its vast societal responsibilities and enormous task of educating the young, must keep pace with the changes caused by technological advances. These advances in technology accentuate the necessity for Alabama students to participate in a comprehensive, contemporary, technologically oriented education program that will enable them to make appropriate educational and career decisions. Technology Education offers assistance to students by serving as the interpreter of technology in the school. It is a technology literacy program designed to develop students' interests in technical careers in today's technological society.

To accomplish this ultimate goal of technological literacy, the student will need an understanding of scientific, mathematical, social studies, and communication concepts along with an understanding of behaviors of various technological systems. Technology Education is a discipline of education for everyone. It draws from technological subject matter developed to promote understanding of technology, including its origins and development, and the individual relationship to the environment through the use of unique curriculum, facilities, and methodology. Technology Education provides an opportunity for students to explore careers and to gain an understanding of our industrial/technical society especially in the areas of information, physical, and bio-related technologies. Each of these areas represents a system of adaptive human behavior and technical endeavors that exist to extend human potential through technology. Technology Education of today and tomorrow is much more than a prevocational program or just an exploratory vocational program. In today's society, it is just as integral and basic as reading, writing, or arithmetic.

Technology Education Goals

The goals of Technology Education are:

- *To provide the conceptual framework (terminology, utilization, implications) for the understanding of historical, contemporary, and future technologies.*
- *To provide opportunities to explore the impact of technologies on society and the environment.*
- *To develop an understanding of technological processes.*
- *To utilize technical information and academic and critical thinking skills to solve technological problems.*
- *To provide orientation to and exploration of careers associated with contemporary technologies.*
- *To provide opportunities for students to discover individual potential, creativity, and talent as a base for continuous lifelong learning in a technological society.*
- *To develop leadership abilities.*
- *To develop the ability to work within a team environment.*
- *To develop responsible attitudes in work ethics, safe work practices, and quality.*
- *To provide application-oriented instruction with students reinforcing abstract concepts with concrete experience.*

Definitions

Audio Technology: Any technology relating to or used in the transmission, reception, or duplication of sound

Construction Technology: The effective use of materials, labor, equipment, methods, and management resources to produce a structure

Energy: The ability to do work. Energy has many forms that include mechanical, chemical, thermal, electrical light, and nuclear.

Fuel and Chemical Production Technology: Concerned with the technological activities required in using fuel and/or chemical application to provide energy to turn resources into usable goods and services

Healthcare Technology: The technology concerned with the following three areas: prevention of disease, assessment of health conditions (diagnosis), and the effective treatment of disease

Human Factors Engineering Technology: The act of designing and making products and environments to fit people

Manufacturing Technology: The application of the technological systems of production and material processing that efficiently utilizes resources to extract and convert raw and recycled materials into industrial and consumer goods

Plant and Animal Cultivation Technology: The technologies related to food and livestock production, research in genetic improvement, pest control development, land and resource management, and food and beverage processing

Power: A measure of something being accomplished through the process of movement by electrical, mechanical, or fluid (hydraulics/pneumatics) means

Technology: Human activity that solves problems and extends capabilities through the manipulation and control of the environment by using knowledge, creativity, and resources

Technology Education: Education about technology--its processes, evolution, systems, resources, limitations, impacts, products, and problems--in its historical, environmental, economic, and cultural context. Through problem-solving processes, students learn to research, study, create, and evaluate.

Transportation Technology: Any technology that is used to transport or move people and goods within a society

Visual Technology: Any technology relating to or used in the transfer, transmission, reception, or duplication of visual information

Waste Management and Applications Technology: Technology focused on the handling of waste: any materials given up, discarded, or not needed by society. Waste affects land, water, and air. Wastes are classified into solids, sewage, and hazardous materials. The technology is also concerned with the management of emergency response to accidents, spills, and uncontrolled releases into the environment

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The Conceptual Framework: Alabama's Technology Education Program

The graphic on page 7 represents the conceptual framework of Alabama's Technology Education Program. This diagram represents the organizational structure that provides unity in the program.

The goals of the program are to develop Career Awareness, Technology Literacy, and Problem-Solving Skills. There must also be a strong application of the academic areas of communications, mathematics, science, and social studies as they relate to Technology Education. These goals and applications are accomplished by introducing the student to the three major areas of technology: Information Technologies, Physical Technologies, and Bio-Related Technologies.

INFORMATION TECHNOLOGIES - The processes of gathering, manipulating, and disseminating information from one source to another and the technologies involved with these processes

PHYSICAL TECHNOLOGIES - The processes of manipulating, controlling, and re-configuring the physical and material properties of matter and energy and the technologies associated with these properties

BIO-RELATED TECHNOLOGIES - The practical application of mechanical devices, products, substances, or organisms to improve health or contribute to the harmony between humans and their environment

These areas are presented on three levels. Each level introduces the student to the technologies on a broad basis through a curriculum containing the strands of careers, concepts, processes, and applications in the technology area being studied.

CAREERS - The exploration of the occupations related to the technology area being studied, educational preparation, variety of work settings and benefits, adaptability of the changing work place, and the ability to access career-related information and to perform a self assessment for that career area

CONCEPTS - The development of a technical knowledge base within the technology area being studied by including the terminology, utilization, and implications on the individual, society, and environment

PROCESSES - The activities involving the utilization of the technology being studied

APPLICATIONS - Uses of the technology to solve a given problem by incorporating reasoning, critical-thinking skills, and assimilation

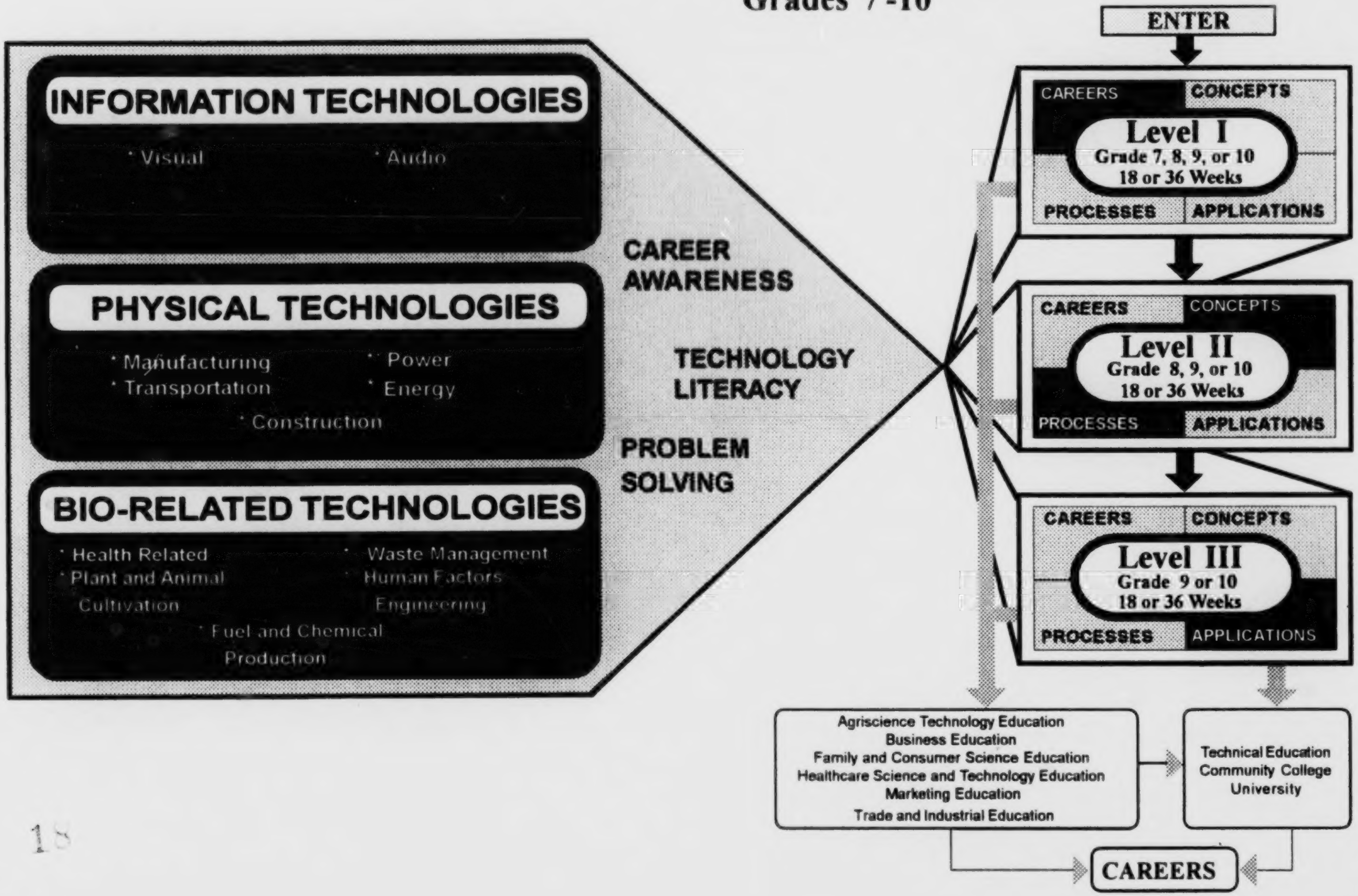
The Technology Education program is designed around three levels that are not grade specific. Time should be dedicated equally to all three technological content areas. Every student will enter Level I before proceeding to the next level that will build on Level I. Level I offers the broadest base of technological studies for a minimum of 18 weeks, allowing the student to explore a variety of careers available within the different technological areas. Level I can be offered in Grade 7, 8, 9, or 10 depending on the individual school system's schedule. Level I can be offered in increments of 6, 9, 12, 18, or 36 weeks across grade lines, especially Grades 7 & 8. Level II, an 18-to 36-week course for Grade 8, 9, or 10, is designed to expose the student to multiple processes and concepts of the technologies being studied and to aid him/her further in exploring a variety of career opportunities. Before a student can enter Level II, he/she must have a minimum of 18 weeks in Level I, thus acquiring a broad base of technological study. Finally, Level III for Grade 9 or 10 requires the student to apply the information gained in Levels I and II in multifaceted problem-solving situations by utilizing a variety of technologies. The student will spend 18 to 36 weeks at Level III.

At Level I, the student rotates equally through various technologies within the three technological content areas of Information, Physical, and Bio-Related Technology. In Level I, the content focus will be on the *career* strand with the remaining three strands acting as the foundation of technical literacy. In Level II, the *concepts* and *processes* strands are the main focuses of the curriculum with the career and applications strands providing the relationship between the technology area being studied and real-world applications. When the student reaches Level III, the focus is on the *applications* strand, while the other three strands provide the basis of technical literacy for applying problem-solving skills in the technology areas being studied.

A natural flow should occur from one level to the next within Technology Education; however, a student is not required to take all three levels. Once a student develops an interest in a certain career, a smooth transition should occur from Technology Education to career preparation areas of Agriscience Technology Education, Business Education, Family and Consumer Science Education, Healthcare Science and Technology Education, Marketing Education, or Trade and Industrial Education.

ALABAMA TECHNOLOGY EDUCATION EXPLORATORY PROGRAM

Grades 7 -10



ENTER

INFORMATION TECHNOLOGIES

- Visual
- Audio

PHYSICAL TECHNOLOGIES

- Manufacturing
- Transportation
- Power
- Energy
- Construction

BIO-RELATED TECHNOLOGIES

- Health Related
- Plant and Animal Cultivation
- Waste Management
- Human Factors Engineering
- Fuel and Chemical Production

CAREER AWARENESS

TECHNOLOGY LITERACY

PROBLEM SOLVING

CAREERS | CONCEPTS
Level I
Grade 7, 8, 9, or 10
18 or 36 Weeks
PROCESSES | APPLICATIONS

CAREERS | CONCEPTS
Level II
Grade 8, 9, or 10
18 or 36 Weeks
PROCESSES | APPLICATIONS

CAREERS | CONCEPTS
Level III
Grade 9 or 10
18 or 36 Weeks
PROCESSES | APPLICATIONS

Agriscience Technology Education
Business Education
Family and Consumer Science Education
Healthcare Science and Technology Education
Marketing Education
Trade and Industrial Education

Technical Education
Community College
University

CAREERS

Instruction-Related Elements of a Technology Education Program

CLASSROOM ENVIRONMENT

Throughout the three levels of Technology Education, the utilization of hands-on activities must occur to reinforce the learning activities of the students while providing the opportunities to develop team work and problem-solving skills.

During the students' rotation through a given technological area, they will utilize a variety of instructional tools (audio/video, computer simulation, and hands-on activities). Students must rotate equally through a variety of experiences in all three technological areas: Information Technologies, Physical Technologies, and Bio-Related Technologies. Thus they develop a broad understanding of technical literacy and career awareness.

It is the responsibility of the teacher to provide and maintain a safe instructional environment. The teacher should make sure that students can safely handle and operate hardware, software, and supplies that are utilized within the Technology Education program. Active hands-on learning increases the potential for injuries; for this reason, it is recommended that all technology education teachers be certified in first aid. A written safety plan should be an essential part of the Technology Education program.

INTEGRATION OF ACADEMICS

The field of Technology Education includes a problem-solving process emphasizing the application, control, and integration of technologies. To achieve the solution to a given problem, the student must rely upon an appropriate background in communication, mathematics, science, and social studies as well as in the knowledge of technologies.

MEETING THE NEEDS OF SPECIAL POPULATIONS

Courses, instructional strategies, and equipment may be modified to ensure that special populations have equal access to the full range of learning experiences and skill development in Technology Education. Individual needs of students must be determined by assessments of their interests, abilities, and special needs. Once individual needs have been determined, a support service program, planned cooperatively with the vocational teacher and support personnel, may be initiated.

STUDENT ORGANIZATIONS

The Technology Student Association (TSA) is the appropriate student organization for providing leadership training experiences and reinforcing specific technical literacy. The Technology Student Association shall be an integral part of the instructional program, and activities of the association are defined as part of the curriculum in accordance with State Department policies.

The mission of the Technology Student Association is to help students develop an understanding of all aspects of industry and technology and to aid them in the discovery and development of individual potential. The goals of TSA are these.

- *Develop leadership and citizenship in social, economic, scholastic, and civic activities.*
- *Increase the knowledge and understanding of our technological society.*
- *Assist Technology Education students in the exploration of occupational choices.*
- *Serve the school/community through technology-related projects.*

TEACHER QUALIFICATIONS

The content areas in Technology Education call for highly qualified individuals. Not only are they to be knowledgeable in the areas of communications, mathematics, science, and social studies but also to have a broad background in technology. Teachers for this area should, therefore, be certified in the area of Industrial Arts/Technology Education. As technology continues to change, it is essential for teachers to seek continous professional development to stay abreast of current trends and methods pertaining to Technology Education subjects.

DIRECTIONS FOR INTERPRETING THE MINIMUM REQUIRED CONTENT

1. Content Standards are statements of what students should know and be able to do. In this document, the minimum-required content as prescribed by the Alabama State Board of Education (Ala. Code 16-35-3) is listed as content standards. The order in which content standards are listed is not intended to convey a sequential order for instruction. A content standard may describe a content or skill that will be addressed throughout the program level.

2. Content standards describe what students should know and be able to do at the conclusion of a level. Each content standard contains a **Stem** that completes the phrase, "Students will ...." The stem describes what students are expected to do by the end of a course level.

> Students will:
> *Relate their personal aptitude to the requirements of the career.*
> (Level I)

3. Additional minimum required content may be listed under a content standard and denoted by a hyphen. The **Additional Content** provides further specificity for the content standard.

> Students will:
> *Develop an awareness of careers in the technology area being studied.*
> - *Historical*
> - *Contemporary*
>
> (Level I)

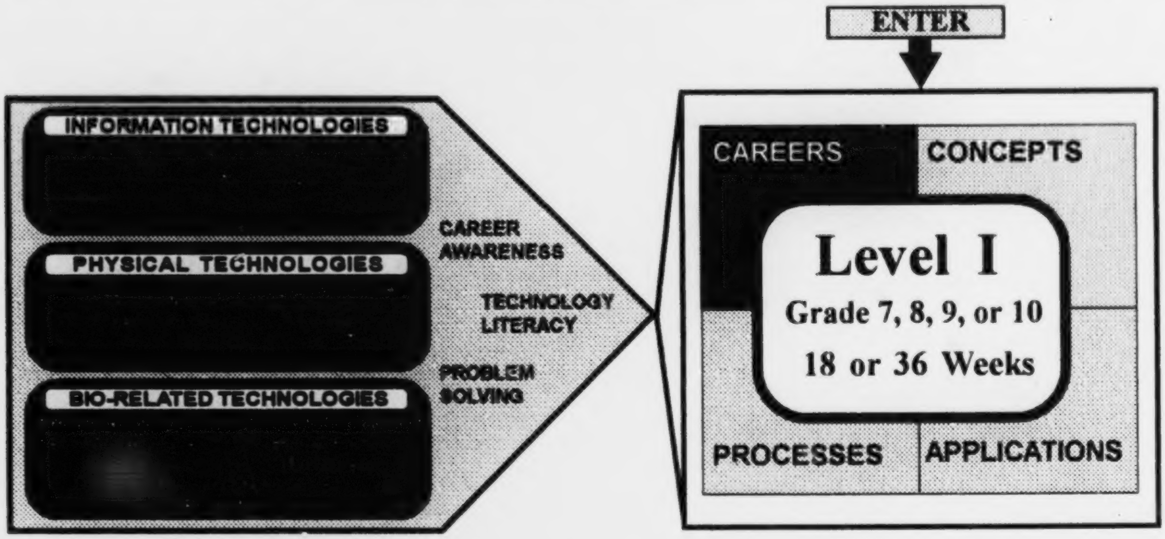
4. **Examples** help to clarify the content standard. They are illustrative but not exhaustive. Teachers may add to or substitute examples when planning instruction.

> Students will:
> *Develop employability skills.*
> *Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics.*
> (Level I)

ALABAMA TECHNOLOGY EDUCATION

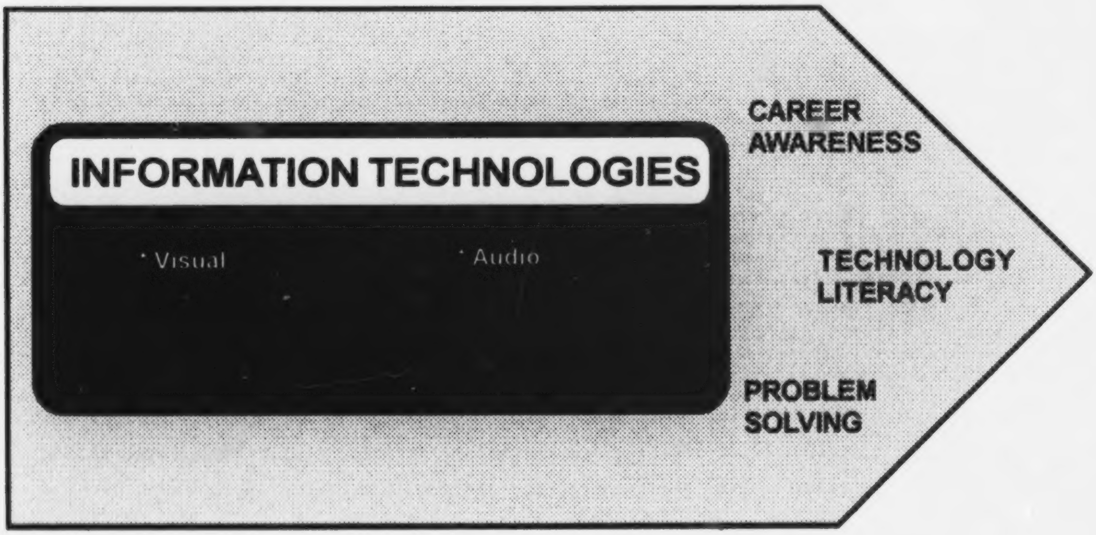
Content Standards for LEVEL I

Narrative: Content standards for Level I place emphasis on the *awareness of different careers* that are available within the three technological areas of studies: Information Technologies, Physical Technologies, and Bio-Related Technologies. Time should be dedicated equally to all three technological content areas. Every student will enter Level I before proceeding to the next level. Level I offers the broadest base of technological studies for a minimum of 18 weeks that can be offered in Grade 7, 8, 9, or 10 depending on the individual school system's schedules. Level I can be offered in increments of 6, 9, 12, 18, or 36 weeks across grade lines, especially in Grades 7 and 8. This study of *careers* is to be supported with appropriate activities for all three areas of technology. The Technology Student Association (TSA) shall be an integral part of the instructional program, and activities of the association are defined as part of the curriculum in accordance with State Department policies. The examples given in the content standards are for consistency. They are not intended to limit the scope of careers being studied within each area.


ENTER
INFORMATION TECHNOLOGIES
PHYSICAL TECHNOLOGIES
BIO-RELATED TECHNOLOGIES
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING
CAREERS
CONCEPTS
Level I
Grade 7, 8, 9, or 10
18 or 36 Weeks
PROCESSES
APPLICATIONS

ALABAMA TECHNOLOGY EDUCATION

INFORMATION TECHNOLOGIES - process of gathering, manipulating, and disseminating information from one source to another


INFORMATION TECHNOLOGIES
• Visual
• Audio
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Information Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Animation
Desktop Publishing
Fiber Optics
Photography
Radio Broadcasting
Virtual Reality
Automated Communications
Digital Communication
Information Highway
Precision Measurement
Sign-making
Computer-Aided Design
Drafting
Lasers
Programmable Logic Control
Video Production

LEVEL I

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
Careers	Students will: 1. Develop an awareness of careers in the Visual Technology area being studied. - Historical - Contemporary 2. Recognize the educational preparations required for careers in Visual Technology area being studied. 3. Be able to research various information sources indicating current and projected employment opportunities in the Visual Technology area being studied. 4. Relate their personal aptitude to the requirements of careers in the Visual Technology area being studied. Example: informal self-assesment 5. Demonstrate interpersonal skills as they relate to the work place. Example: working in teams 6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics 7. Identify the types and levels of work common to careers in the Visual Technology area being studied. 8. Relate careers being studied to the real world through hands-on activities. Examples: video production, photography, signmaking

LEVEL I

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	9. Identify basic concepts and processes associated with careers in the Visual Technology area being studied.
Concepts	10. Identify various visual communications processes. Examples: drafting, photography, video production
	11. Identify various production processes used in the Visual Communication Technology area being studied. Examples: screen printing, relief printing, offset printing, continuous tone photography
	12. Exhibit an understanding of the terminology associated with the Visual Technology area being studied.
	13. Describe uses of the Visual Technology area being studied.
Processes	14. Understand the steps in following oral and written directions.
	15. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	16. Be aware of the steps necessary to complete a given task as assigned.
Applications	17. Follow oral and written directions.
	18. Handle and/or operate safely the hardware, software, and supplies used in the Visual Technology area being studied.
	19. Complete given tasks as assigned.
	20. Demonstrate the application of the Visual Technology process in the area being studied in a problem-solving situation.

LEVEL I

Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Audio Technology area being studied. - Historical - Contemporary 2. Recognize the educational preparations required for careers in the Audio Technology area being studied. 3. Be able to research various information sources indicating current and projected employment opportunities in the Audio Technology area being studied. 4. Relate their personal aptitude to the requirements of careers in the Audio Technology area being studied. Example: informal self- assessment 5. Demonstrate interpersonal skills as they relate to the work place. Example: working in teams 6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics 7. Identify the types and levels of work common to careers in the Audio Technology area being studied.

LEVEL I

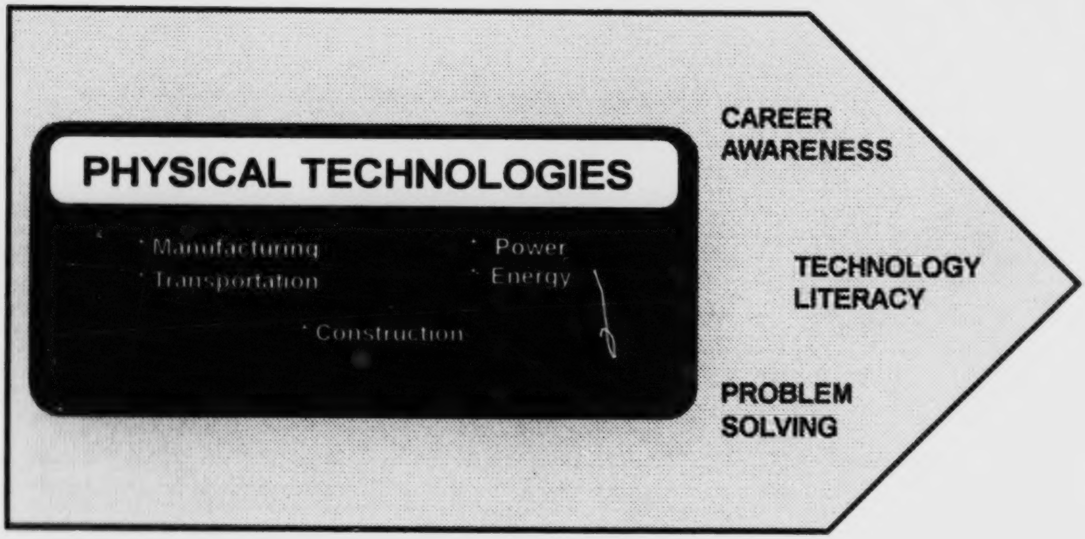
Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	8. Relate careers being studied to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with careers in the Audio Technology field being studied.
Concepts	10. Exhibit an understanding of the terminology associated with the Audio Technology area being studied.
	11. Describe uses of the Audio Technology being studied.
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
Applications	15. Follow oral and written directions.
	16. Handle and/or operate safely the hardware, software, and supplies used in the Audio Technology area being studied.
	17. Complete given tasks as assigned.
	18. Demonstrate the application of the Audio Technology process in the area being studied in a problem-solving situation.

ALABAMA TECHNOLOGY EDUCATION

PHYSICAL TECHNOLOGIES - the process of manipulating, controlling, and re-configuring the physical and material properties of matter and energy and the technologies associated with those properties


PHYSICAL TECHNOLOGIES
· Manufacturing
· Transportation
· Power
· Energy
· Construction
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Physical Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Aerospace
Computer-Aided Manufacturing
Computer Construction
Computer-Integrated Manufacturing
Computer Numerical Control
Construction
Electricity
Flight Systems
Fluids
Internal Combustion Technology
Material Handling Technology
Material Processes
Mechanics
Packaging Technology
Plastics Technology
Propulsion Systems Technology
Research & Design
Robotics
Structural Engineering
Transportation

LEVEL I

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Manufacturing Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for careers in the Manufacturing Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Manufacturing Technology area being studied.
	4. Relate their personal aptitude to the requirements of careers in the Manufacturing Technology area being studied. Example: informal self-assesment
	5. Demonstrate interpersonal skills as they relate to the work place. Example: working in teams
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Manufacturing Technology area being studied.

LEVEL I

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	8. Relate careers being studied to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with careers in the Manufacturing Technology area being studied.
Concepts	10. Exhibit an understanding of the terminology associated with the Manufacturing Technology area being studied.
	11. Describe uses of the Manufacturing Technology area being studied.
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
Applications	15. Follow oral and written directions.
	16. Handle and/or operate safely the hardware, software, and supplies used in the Manufacturing Technology area being studied.
	17. Complete given tasks as assigned.
	18. Demonstrate the application of the Manufacturing Technology process in the area being studied in a problem-solving situation.

LEVEL I

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Transportation Technology area being studied. - Historical -Contemporary
	2. Recognize the educational preparations required for different careers related to the Transportation Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Transportation Technology area being studied.
	4. Relate their personal aptitudes to the requirements of different careers within the Transportation Technology area being studied.
	5. Demonstrate interpersonal skills as they relate to the work environment.
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics.
	7. Identify the types and levels of work common to careers in the Transportation Technology area being studied.
	8. Relate careers in Transportation Technology to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with the different careers in the Transportation Technology area being studied.

LEVEL I

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the Transportation Technology area being studied.
	11. Identify and give examples of each of the four environmental divisions of Transportation Technology. - Atmospheric - Aquatic - Terrestrial - Space
	12. Develop an awareness of the relationship of mathematics, science, communication, social studies, and computers to the Transportation Technology area being studied.
Processes	13. Understand the steps in following oral and written directions.
	14. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	15. Be aware of the steps necessary to complete a given task as assigned.
Applications	16. Follow oral and written directions.
	17. Complete given tasks as assigned.
	18. Handle and/or operate safely the hardware, software, and supplies used in the Transportation Technology area being studied.
	19. Produce a vehicle to demonstrate the principles of the Transportation Technology area being studied.
	20. Demonstrate the application of the transportation processes in a problem-solving situation.

LEVEL I

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Power Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for careers in the Power Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Power Technology area being studied.
	4. Relate their personal aptitude to the requirements of careers in the Power Technology area being studied. Example: informal self-assesment
	5. Demonstrate interpersonal skills as they relate to the work environment. Example: working in teams
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Power Technology area being studied.

LEVEL I

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	8. Relate careers being studied to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with careers in the Power Technology area being studied.
Concepts	10. Develop an awareness of the relationship of mathematics, science, communication, social studies, and computers to the Power Technology area being studied.
	11. Identify and investigate the various forms of power. - Electrical - Mechanical - Fluid (hydraulics/pneumatics)
	12. Differentiate betweeen two- and four-cycle engine designs.
	13. Exhibit an understanding of the terminology associated with the Power Technology area being studied.
	14. Identify common methods for generating electricity for commercial use.
	15. Explain the usages and simple applications of hydraulic and pneumatic power technology.
	16. Describe uses of the Power Technology area being studied.
Processes	17. Understand the steps in following oral and written directions.
	18. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	19. Be aware of the steps necessary to complete a given task as assigned.

LEVEL I

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Applications	20. Follow oral and written directions.
	21. Handle and/or operate safely the hardware, software, and supplies used in the Power Technology field being studied.
	22. Complete given tasks as assigned.
	23. Demonstrate the application of the Power Technology process in the area being studied in a problem-solving situation.
	24. Use simulation devices or systems that generate, convert, and control power technology systems.

LEVEL I

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Energy Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for careers in the Energy Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Energy Technology area being studied.
	4. Relate their personal aptitude to the requirements of careers in the Energy Technology area being studied. Example: informal self-assesment
	5. Demonstrate interpersonal skills as they relate to the work environment. Example: working in teams
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Energy Technology area being studied.

LEVEL I

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	8. Relate careers being studied to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with careers in the Energy Technology area being studied.
Concepts	10. Develop an awareness of the relationship of mathematics, science, communications, social studies, and computers to the Energy Technology area being studied.
	11. Identify and investigate the various forms of energy. - Chemical - Thermal - Electrical - Radiant (light) - Mechanical - Nuclear
	12. Describe sources of energy.
	13. Illustrate an understanding of simple wiring techniques. Examples: parallel, series
	14. Identify the fundamentals of basic electronics.
	15. Exhibit an understanding of the terminology associated with the Energy Technology area being studied.
	16. Describe uses of the Energy Technology area being studied.
Processes	17. Understand the steps in following oral and written directions.
	18. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.

LEVEL I

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	19. Be aware of the steps necessary to complete a given task as assigned.
Applications	20. Follow oral and written directions.
	21. Handle and/or operate safely the hardware, software, and supplies used in the Energy Technology field being studied.
	22. Complete given tasks as assigned.
	23. Demonstrate the application of the Energy Technology process in the area being studied in a problem-solving situation.
	24. Use simulation devices or systems that generate, convert, and control energy technology systems.

LEVEL I

Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Construction Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for careers in the Construction Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Construction Technology area being studied.
	4. Relate their personal aptitude to the requirements of careers in the Construction Technology area being studied. Example: informal self-assesment
	5. Demonstrate interpersonal skills as they relate to the work environment. Example: working in teams
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in Construction Technology area being studied.
	8. Relate careers being studied to the real world through hands-on activities.

LEVEL I

Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers (continued)	9. Develop an awareness of the variety of structures related to Construction Technology. - Highways - Bridges - Homes - Commercial buildings - Communication towers
	10. Identify technologies used in construction. - Lasers - Safety - Disposal systems - Ergonomics - Engineered systems - Sound and communications - Climate control systems - Energy and conservation
	11. Identify basic concepts and processes associated with careers in the Construction Technology area being studied.
	12. Demonstrate an awareness of the design and engineering practices used in the Construction Technology area being studied.
Concepts	13. Develop an awareness of the relationship of mathematics, science, communications, social studies, and computers to the Construction Technology area being studied.
	14. Exhibit an understanding of the terminology associated with the Construction Technology area being studied. - Materials - Tools - Processes

LEVEL I

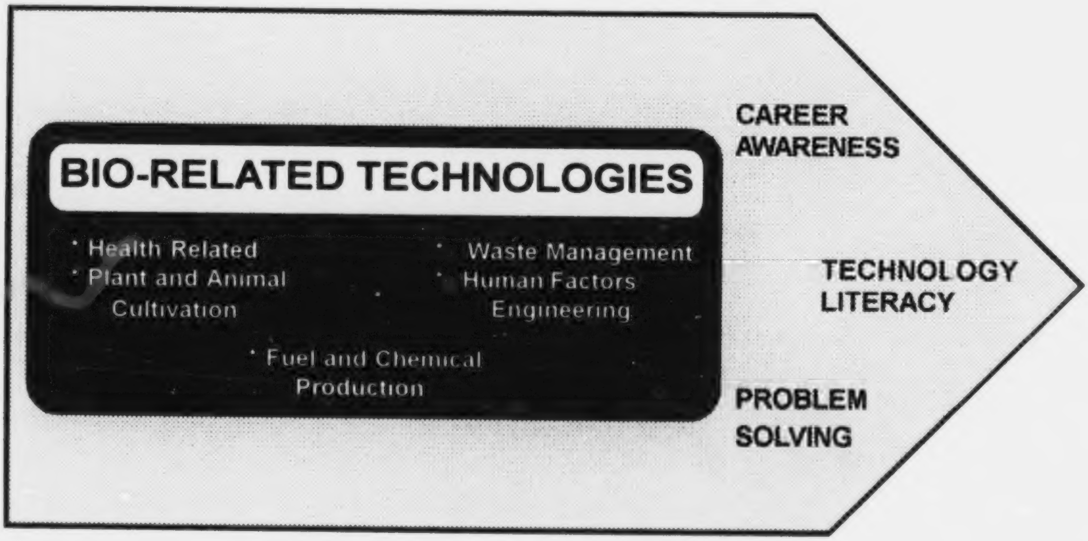
Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	15. Describe uses of the Construction Technology area being studied.
Processes	16. Understand the steps in following oral and written directions.
	17. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	18. Be aware of the steps necessary to complete a given task as assigned.
Applications	19. Follow oral and written directions.
	20. Handle and/or operate safely the hardware, software, and supplies used in the Construction Technology area being studied.
	21. Complete given tasks as assigned.
	22. Demonstrate the application of the Construction Technology process in the area being studied in a problem-solving situation. Examples: comparing the efficiency of various insulations, demonstrating the use of lasers in construction

ALABAMA TECHNOLOGY EDUCATION

BIO-RELATED TECHNOLOGIES - the practical application of mechanical devices, products, substances, or organisms to improve health or contribute to the harmony between humans and their environment


BIO-RELATED TECHNOLOGIES
Health Related
Plant and Animal Cultivation
Waste Management
Human Factors Engineering
Fuel and Chemical Production
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Bio-Related Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18- or 36-week courses.

Alternate Energies
Human Factors Engineering
Meteorology

Aquaponics
Hydroponics
Waste Management

Biotechnology Engineering
Medical Technology

LEVEL I

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Health Related Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for different careers related to the Health Related Technology area being studied.
	3. Be able to research various information sources, indicating current and projected employment opportunities in the Health Related Technology area being studied.
	4. Relate their personal aptitudes to the requirements of different careers within the Health Related Technology area being studied.
	5. Demonstrate interpersonal skills as they relate to the work environment.
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Health Related Technology area being studied.
	8. Relate careers being studied in Health Related Technology to the real world through hands-on activities.
	9. Identify basic concepts and processes associated with the different careers in the Health Related Technology area being studied.

LEVEL I

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the Health Related Technology area being studied.
	11. Describe uses of the technologies associated with the Health Related Technology area being studied.
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
Applications	15. Follow oral and written directions.
	16. Handle and/or operate safely the hardware, software, and supplies used in the study of Health Related Technology.
	17. Complete given tasks as assigned.
	18. Design an activity to demonstrate the principles of the Health Related Technology area being studied. Example: take a pulse rate and relate it to a printout of an electrocardiogram (EKG)
	19. Demonstrate the application of the Health Related Technology process in the area being studied in a problem-solving situation.

LEVEL I

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Plant and Animal Cultivation Technology area being studied. -Historical -Contemporary
	2. Recognize the educational preparations required for different careers related to the Plant and Animal Cultivation Technology area being studied.
Cultivation	3. Be able to research various information sources indicating current and projected employment opportunities in the Plant and Animal Technology area being studied.
	4. Relate their personal aptitudes to the requirements of different careers within the Plant and Animal Cultivation Technology area being studied.
	5. Demonstrate interpersonal skills as they relate to the work environment.
	6. Develop employability skills. Examples: being punctual and prepared, following directions(written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Plant and Animal Cultivation Technology area being studied.
	8. Relate careers in Plant and Animal Cultivation Technology to the real world through relevant hands-on activities.
	9. Identify basic concepts and processes associated with the different careers in the Plant and Animal Cultivation Technology area being studied.

LEVEL I

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the Plant and Animal Cultivation Technology area being studied.
	11. Describe uses of the technologies associated with the Plant and Animal Cultivation Technology area being studied.
	12. Define plant and animal genetics and give examples of how each has improved a plant product and an animal product.
Processes	13. Understand the steps in following oral and written directions
	14. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	15. Be aware of the steps necessary to complete a given task as assigned.
Applications	16. Follow oral and written directions.
	17. Handle and/or operate safely the hardware, software, and supplies used in the study of Plant and Animal Cultivation Technology.
	18. Produce a model to demonstrate the principles of the Plant and Animal Cultivation Technology areas being studied.
	19. Demonstrate the application of the Plant and Animal Cultivation Technology processes in a problem-solving situation.

LEVEL I

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Waste Management Technology area being studied. - Historical - Contemporary
	2. Recognize the educational preparations required for different careers related to the Waste Management Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Waste Management Technology area being studied.
	4. Relate their personal aptitudes to the requirements of different careers within the Waste Management Technology area being studied.
	5. Demonstrate interpersonal skills as they relate to the work environment.
	6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Waste Management Technology area being studied.
	8. Relate careers in Waste Management Technology to the real world through relevant activities.
	9. Identify basic concepts and processes associated with the different careers in the Waste Management Technology area being studied.

LEVEL I

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the Waste Management Technology area being studied.
	11. Describe uses of the technologies associated with the Waste Management Technology area being studied.
	12. Identify and give examples of biological and chemical waste processing.
Processes	13. Understand the steps in following oral and written directions.
	14. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	15. Be aware of the steps necessary to complete a given task as assigned.
Applications	16. Follow oral and written directions.
	17. Handle and/or operate safely the hardware, software, and supplies used in the study of Waste Management Technology.
	18. Produce a model to demonstrate the principles of the Waste Management Technology area being studied.
	19. Demonstrate the application of the Waste Management Technology processes in a problem-solving situation.

LEVEL I

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Human Factors Engineering Technology area. - Historical - Contemporary 2. Recognize the educational preparations required for different careers related to the field of Human Factors Engineering Technology. 3. Be able to research various information sources indicating current and projected employment opportunities in the area of Human Factors Engineering Technology. 4. Relate their personal aptitudes to the requirements of different careers within the area of Human Factors Engineering Technology. 5. Demonstrate interpersonal skills as they relate to the work environment. 6. Develop employability skills. Examples: being punctual and prepared, following directions (written and oral), having pride in quality, exhibiting appropriate work ethics 7. Identify the types and levels of work common to careers in the area of Human Factors Engineering Technology. 8. Relate careers in Human Factors Engineering Technology to the real world through hands-on activities. 9. Identify basic concepts and processes associated with the different careers in the Human Factors Engineering Technology area.

LEVEL I

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the area of Human Factors Engineering Technology.
	11. Describe uses of the technologies associated with Human Factors Engineering Technology.
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
Applications	15. Follow oral and written directions.
	16. Handle and/or operate safely the hardware, software, and supplies used in the study of Human Factors Engineering Technology.
	17. Produce a model to demonstrate the principles of the Human Factors Engineering Technology area being studied.
	18. Demonstrate the application of the Human Factors Engineering Technology processes in a problem-solving situation.

LEVEL I

Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Develop an awareness of careers in the Fuel and Chemical Production Technology area being studied. -Historical -Contemporary
	2. Recognize the educational preparations required for different careers related to the Fuel and Chemical Production Technology area being studied.
	3. Be able to research various information sources indicating current and projected employment opportunities in the Fuel and Chemical Production Technology area being studied.
	4. Relate their personal aptitudes to the requirements of different careers within the Fuel and Chemical Production Technology area being studied.
	5. Demonstrate interpersonal skills as they relate to the work environment.
	6. Develop employability skills. Examples: being punctual and prepared, following directions, (written and oral), having pride in quality, exhibiting appropriate work ethics
	7. Identify the types and levels of work common to careers in the Fuel and Chemical Production Technology area being studied.
	8. Relate careers in Fuel and Chemical Production Technology to the real world through relevant hands-on activities.
	9. Identify basic concepts and processes associated with the different careers in the Fuel and Chemical Production Technology area being studied.

LEVEL I

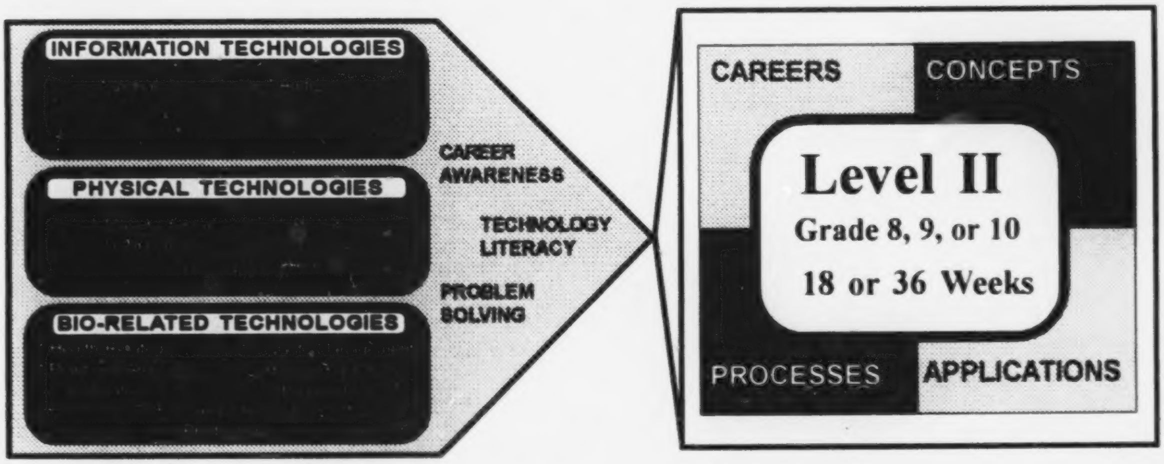
Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts	10. Exhibit an understanding of the terminology associated with the Fuel and Chemical Production Technology area being studied.
	11. Describe uses of the technologies associated with Fuel and Chemical Production Technology area being studied.
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
Applications	15. Follow oral and written directions.
	16. Complete given tasks as assigned.
	17. Handle and/or operate safely the hardware, software, and supplies used in the study of Fuel and Chemical Production Technology.
	18. Produce a model to demonstrate the principles of the Fuel and Chemical Production Technology areas being studied.
	19. Demonstrate the application of the Fuel and Chemical Production Technology processes in a problem- solving situation.

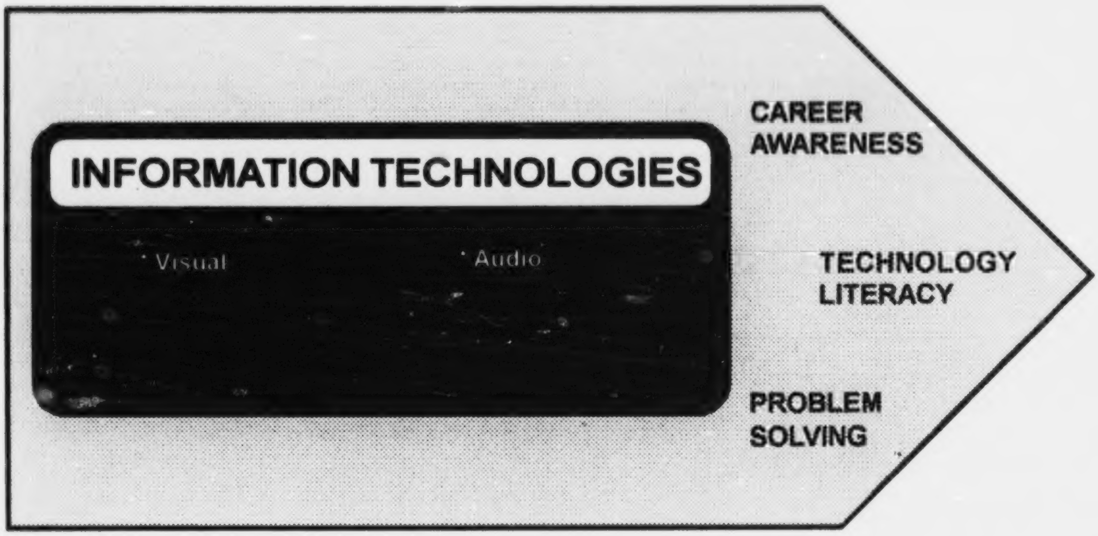
Content Standards for LEVEL II

Narrative: Content standards for Level II, an 18-to 36-week course for Grade 8, 9, or 10, emphasize the *concepts* and *processes* that are inherent within the three technological areas of studies: Information Technologies, Physical Technologies, and Bio-Related Technologies. Time should be dedicated equally to all three technological content areas. This study of *concepts* and *processes* is to be supported with appropriate activities for all three areas of technology. Before a student can enter Level II, he/she must have had a minimum of 18 weeks in Level I. The Technology Student Association (TSA) shall be an integral part of the instructional program, and activities of the association are defined as part of the curriculum in accordance with State Department policies. The examples given in the content standards are for consistency. They are not intended to limit the scope of the concepts and processes being studied.


INFORMATION TECHNOLOGIES
PHYSICAL TECHNOLOGIES
BIO-RELATED TECHNOLOGIES
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING
CAREERS
CONCEPTS
Level II
Grade 8, 9, or 10
18 or 36 Weeks
PROCESSES
APPLICATIONS

ALABAMA TECHNOLOGY EDUCATION

INFORMATION TECHNOLOGIES - process of gathering, manipulating, and disseminating information from one source to another


INFORMATION TECHNOLOGIES
• Visual
• Audio
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Information Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Animation
Automated Communications
Computer-Aided Design
Desktop Publishing
Digital Communication
Drafting
Fiber Optics
Information Highway
Lasers
Photography
Precision Measurement
Programmable Logic Control
Radio Broadcasting
Sign-making
Video Production
Virtual Reality

LEVEL II

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Visual Technology area being studied.
	2. Research various information sources to identify career preparations in Visual Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Visual Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Visual Technology area being studied. Examples: computer-assisted design/drafting (CADD), virtual reality, photomorphing, video production, animation
	5. Describe the different economical advantages of the various Visual Technology mediums being studied.
	6. Describe the limitations of the various types of Visual Technology being studied.

LEVEL II

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Describe the principles of design as they relate to the Visual Technology area being studied. - Balance - Unity - Contrast - Typography 8. Describe the various types of Visual Technology mediums and applications as they relate to the individual, industry, and society. 9. Describe various uses of the technologies related to the Visual Technology area being studied. 10. Develop an awareness of the evolution of the Visual Technology area being studied. - Historical - Contemporary - Future 11. Describe the implications that the Visual Technology area being studied has on the economy, environment, individual, and society.

LEVEL II

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Processes	12. Understand the steps in following oral and written directions.
	13. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	14. Be aware of the steps necessary to complete a given task as assigned.
	15. Describe the production process for the Visual Technology area being studied. - Preproduction - Production - Postproduction
	16. Describe the layout process of the Visual Technology area being studied.
	17. Understand the trouble-shooting process involved in the Visual Technology area being studied.
Applications	18. Follow written and oral directions.
	19. Handle and/or operate safely the hardware, software, and supplies used in the Visual Technology field being studied.
	20. Perform as team members to accomplish the application or utilization of the Visual Technology area being studied.
	21. Use the Visual Technology area being studied in problem-solving situations.

LEVEL II

Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Audio Technology area being studied.
	2. Research various information sources to identify career preparations in the Audio Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Audio Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Audio Technology area being studied. Examples: mixing, fading, tracking
	5. Describe various uses of the technologies related to the Audio Technology area being studied.
	6. Develop an awareness of the evolution of the Audio Technology area being studied. - Historical - Contemporary - Future

LEVEL II

Information Technologies

AUDIO

STRANDS	**CONTENT STANDARDS**
	Students will:
Concepts (continued)	7. Describe the different economical advantages of the Audio Technology area being studied.
	8. Describe the limitations of the various types of Audio Technology that is being studied.
	9. Describe the principles of design as they relate to the Audio Technology area being studied. - Balance - Unity - Contrast
	10. Describe the various Audio Technology mediums and applications as they relate to the individual, industry, and society.
	11. Describe the difference between AM and FM modulation as it pertains to Audio Technology.
	12. Describe the different methods of audio transmission.
Processes	13. Describe the implications that the Audio Technology area being studied has on the economy, environment, individual, and society.
	14. Understand the steps in following oral and written directions.

LEVEL II

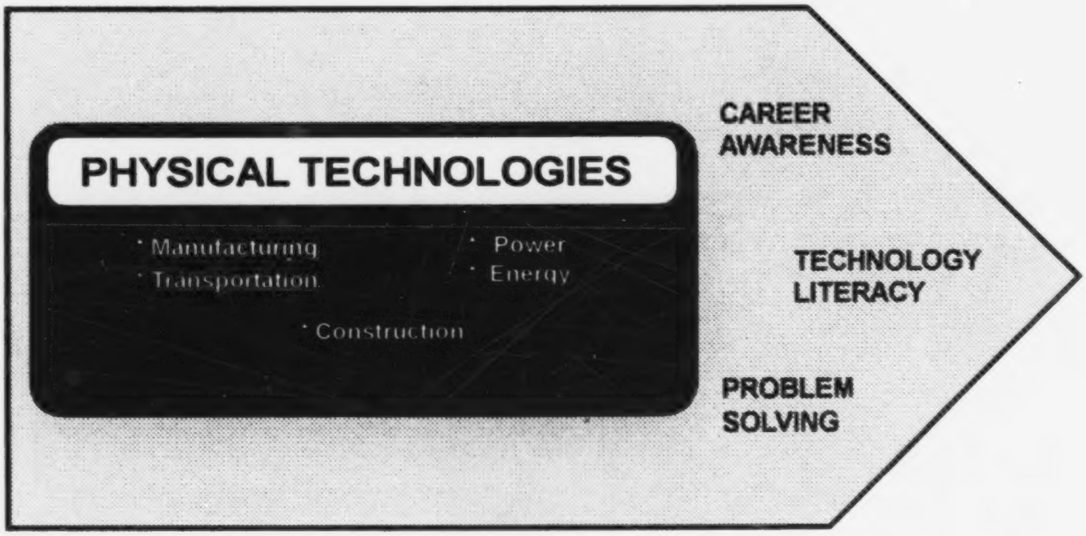
Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	15. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	16. Describe the production process for the Audio Technology area being studied. - Preproduction - Production - Postproduction
	17. Describe the layout process of the Audio Technology area being studied.
	18. Be aware of the steps necessary to complete a given task as assigned.
	19. Understand the trouble-shooting process involved in the Audio Technology area being studied.
Applications	20. Follow written and oral directions.
	21. Handle and/or operate safely the hardware, software, and supplies used in the Audio Technology area being studied.
	22. Perform as team members to accomplish the application or utilization of the Audio Technology area being studied.
	23. Use the Audio Technology being studied in problem-solving situations.

ALABAMA TECHNOLOGY EDUCATION

PHYSICAL TECHNOLOGIES - the process of manipulating, controlling, and re-configuring the physical and material properties of matter and energy and the technologies associated with those properties


PHYSICAL TECHNOLOGIES
• Manufacturing
• Transportation
• Power
• Energy
• Construction
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Physical Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Aerospace
Computer-Aided Manufacturing
Computer Construction
Computer-Integrated Manufacturing
Computer Numerical Control
Construction
Electricity
Flight Systems
Fluids
Internal Combustion Technology
Material Handling Technology
Material Processes
Mechanics
Packaging Technology
Plastics Technology
Propulsion Systems Technology
Research & Design
Robotics
Structural Engineering
Transportation

LEVEL II

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Manufacturing Technology area being studied.
	2. Research various information sources to identify career preparations in the Manufacturing Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Manufacturing Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Manufacturing Technology area being studied. Examples: CAM - Computer-Aided Manufacturing, CIM - Computer-Integrated Manufacturing, CNC - Computer Numerical Control
	5. Describe various uses of the technologies related to the Manufacturing Technology area being studied.
	6. Develop an awareness of the evolution of the Manufacturing Technology area being studied. - Historical - Contemporary - Future

LEVEL II

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Demonstrate an understanding of the mass production process involved in the Manufacturing Technology area being studied.
	8. Describe the different types of ownership.
	9. Describe why quality control is an important and necessary step in the manufacturing process.
	10. Describe the different classifications of manufacturing materials.
	11. Describe the different types of manufactured goods.
Processes	12. Describe the implications that the Manufacturing Technology area being studied has on the economy, environment, individual, and society.
	13. Understand the steps in following oral and written directions.
	14. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	15. Be aware of the steps necessary to complete a given task as assigned.
	16. Understand the trouble-shooting process involved in the Manufacturing Technology area being studied.
	17. Describe the steps involved in the designing and production of manufactured products.

LEVEL II

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Applications	18. Follow oral and written directions.
	19. Handle and/or operate safely the hardware, software, and supplies used in the Manufacturing Technology area being studied.
	20. Perform as team member(s) to accomplish the application or utilization of the Manufacturing Technology area being studied.
	21. Use the Manufacturing Technology area being studied in a problem-solving situation.

LEVEL II

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Transportation Technology area being studied.
	2. Research various information sources to identify career preparations in the Transportation Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Transportation Technology area being studied.
Concepts	4. Demonstrate an understanding of the terminology associated within the Transportation Technology area being studied.
	5. Describe various uses of the technologies related to the Transportation Technology area being studied.
	6. Describe an awareness of the evolution of the technology involved in the Transportation Technology area being studied. - Historical - Contemporary - Future
	7. Describe the implications that Transportation Technology has on the economy, environment, individual, and society.

LEVEL II

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	8. Demonstrate an understanding of the power systems used in the Transportation Technology area being studied.
	9. Demonstrate an understanding of the systems that could be used in Transportation Technology. - Electrical - Mechanical - Fluid
	10. Demonstrate an understanding of the effects that Transportation Technology has on biotechnologies.
	11. Explain the principles of the various types of engines and motors that are used in Transportation Technology.
	12. Demonstrate an understanding of the six different technological systems that are utilized in a given mode of Transportation Technology. - Control - Guidance - Propulsion - Structure - Support - Suspension
	13. Identify the different types of vehicles used in the modes of Transportation Technology listed below. - Aquatic - Atmospheric - Terrestrial - Space

LEVEL II

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Processes	14. Understand the steps in following oral and written directions.
	15. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	16. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
	17. Describe the systems approach to trouble-shooting problems in the Transportation Technology area being studied.
	18. Describe composite materials processing and the way these materials are used in fabricating different Transportation Technology vehicles.
	19. Describe the various types of cargo-handling systems.
	20. Describe and discuss some of the basic principles associated with using a computer simulation to design and test a vehicle for the Transportation Technology area being studied.
Applications	21. Follow oral and written directions.
	22. Handle and/or operate safely the hardware, software, and /or supplies used in the study of Transportation Technology.
	23. Work as an individual or in a team environment utilizing the Transportation Technology area being studied to design, build, and test a model of a Transportation Technology system. Examples: plot and plan the transportation of a product from one point to another; calculate milage, travel time, and transportation cost fromone point to another; use a computer program to design a vehicle for maximum performance.

LEVEL II

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Power Technology area being studied.
	2. Research various information sources to identify career preparations in the Power Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Power Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Power Technology area being studied. Examples: electromagnetic, nuclear, hydraulics, pneumatics
	5. Describe various uses of the technologies related to the Power Technology area being studied.
	6. Develop an awareness of the evolution of the Power Technology area being studied. - Historical - Contemporary - Future

LEVEL II

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Identify and investigate the various forms of power. - Electrical - Mechanical - Fluid (hydraulics/pneumatics)
	8. Evaluate examples of past, present, and future technological innovations in Power Technology.
	9. Explain the principles and theories of mechanical, electrical, and fluid power.
	10. Define how power is controlled in a mechanical energy system. Examples: gears, pulleys, clutches
	11. Differentiate between the external and internal combustion engines.
	12. Compare different types of heat engines. Examples: internal, external; intermittent, continuous; reciprocating, rotary
	13. Identify basic principles of electric motor operation.
	14. Explain the principles and theories of fluid power. Examples: pressure, mechanical advantage, Pascal's Law, Bernoulli's Theorem, Boyle's Law

LEVEL II

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Processes	15. Describe the implications that the Power Technology area being studied has on the economy, environment, individual, and society.
	16. Understand the steps in following oral and written directions.
	17. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	18. Be aware of the steps necessary to complete a given task as assigned.
	19. Understand the trouble-shooting process involved in the Power Technology area being studied.
Applications	20. Follow oral and written directions.
	21. Handle and/or operate safely the hardware, software, and supplies used in the Power Technology area being studied.
	22. Construct models of systems that generate, convert, and control Power Technology.
	23. Perform as team members to accomplish the application or utilization of the Power Technology area being studied.
	24. Use the Power Technology area being studied in problem-solving situations.

LEVEL II

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Energy Technology area being studied.
	2. Research various information sources to identify career preparations in the Energy Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Energy Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Energy Technology area being studied. Examples: fossil fuels, kenetic energy, geothermal energy, nuclear energy
	5. Describe various uses of the technologies related to the Energy Technology area being studied.
	6. Develop an awareness of the evolution of the Energy Technology area being studied. - Historical - Contemporary - Future

LEVEL II

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Identify and investigate the various forms of energy. - Chemical - Thermal - Electrical - Radiant (light) - Mechanical - Nuclear
	8. Evaluate examples of past, present, and future technological innovations in Energy Technology.
	9. Understand the cause and effects of the "energy crises."
	10. Identify fossil fuels, their technology, and the systems used to support them.
	11. Identify ways to convert, control, store, and transmit various forms of energy.
	12. Demonstrate a knowledge of electrical principles and theories. Examples: electron theory, Ohm's Law, Watt's Law, magnetism
	13. Identify the common methods for generating electricity for commercial use.
Processes	14. Describe the implications that the Energy Technology area being studied has on the economy, environment, individual and society.

LEVEL II

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	15. Understand the steps in following oral and written directions.
	16. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	17. Be aware of the steps necessary to complete a given task as assigned.
	18. Understand the trouble-shooting process involved in the Energy Technology area being studied.
	19. State the relationship between the supply and demand of energy resources.
Applications	20. Follow oral and written directions.
	21. Handle and/or operate safely the hardware, software, and supplies used in the Energy Technology area being studied.
	22. Perform as team members to accomplish the application or utilization of the Energy Technology area being studied.
	23. Use the Energy Technology area being studied in a problem-solving situation.
	24. Construct models of systems that generate, convert, and control energy.

LEVEL II

Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Construction Technology area being studied.
	2. Research various information sources to identify career preparations in the Construction Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Construction Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Construction Technology area being studied. Examples: estimating and bidding, substructure, footings, superstructures, foundations, layout and design
	5. Identify and compare various uses of the technologies related to the Construction Technology area being studied. - Lasers - Engineered systems - Sound and communications - Energy conservation - Safety - Power systems - Ergonomics - Waste disposal systems - Climate control systems

LEVEL II

Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	6. Develop an awareness of the evolution of the Construction Technology area being studied. - Historical - Contemporary - Future
	7. Describe the implications that the Construction Technology area being studied has on the economy, environment, individual, and society.
Processes	8. Understand the steps in following oral and written directions.
	9. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	10. Be aware of the steps necessary to complete a given task as assigned.
	11. Understand the trouble-shooting process involved in the Construction Technology area being studied.
Applications	12. Follow oral and written directions.
	13. Handle and/or operate safely the hardware, software, and supplies used in the Construction Technology area being studied.
	14. Perform as team members to accomplish the application or utilization of the Construction Technology area being studied. Example: build a bridge, superstructure, and/or towers

LEVEL II

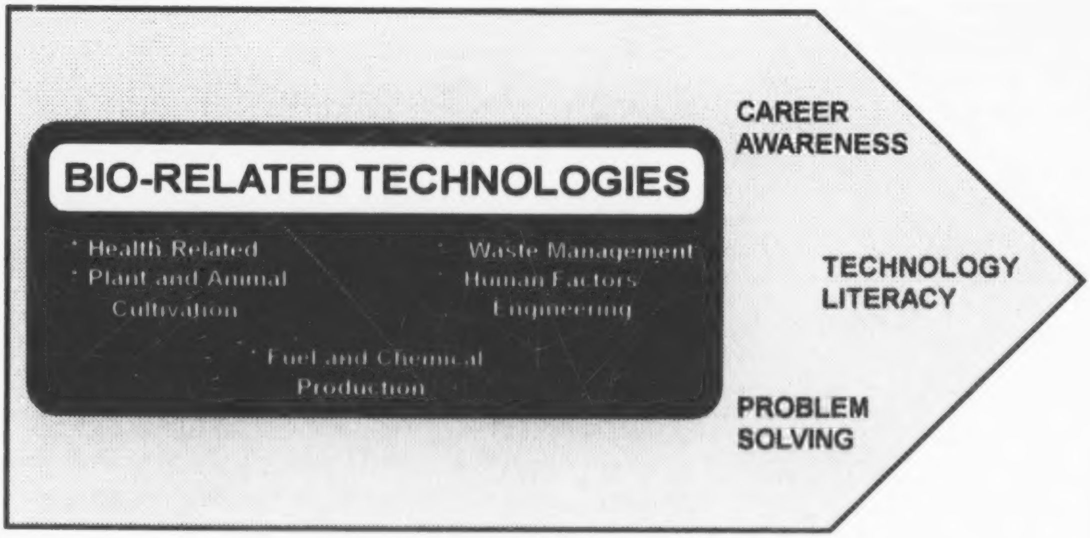
Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	15. Use the Construction Technology area being studied in problem-solving situations. Examples: design a bridge for strength, given the span and material limitations; design a home with given specifications

ALABAMA TECHNOLOGY EDUCATION

BIO-RELATED TECHNOLOGIES - the practical application of mechanical devices, products, substances, or organisms to improve health or contribute to the harmony between humans and their environment


BIO-RELATED TECHNOLOGIES
* Health Related
* Plant and Animal Cultivation
* Waste Management
* Human Factors Engineering
* Fuel and Chemical Production
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Bio-Related Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18- or 36-week courses.

Alternate Energies
Human Factors Engineering
Meteorology

Aquaponics
Hydroponics
Waste Management

Biotechnology Engineering
Medical Technology

LEVEL II

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Health Related Technology area being studied.
	2. Research various information sources to identify career preparations in the Health Related Technology area being studied. -opportunities -benefits -levels -types
	3. Develop and demonstrate interpersonal and employability skills related to the Health Related Technology area being studied. -Work ethics -Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Health Related Technology area being studied. Examples: prevention, diagnosis, treatment.
	5. Describe various uses of the technologies related to the Health Related Technology area being studied.
	6. Develop an awareness of the evolution of the technology involved in the Health Related Technology area being studied. -Historical -Contemporary -Future

LEVEL II

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS

Students will:

Concepts (continued)

7. Describe the implications that the Health Related Technology area being studied has on the economy, environment, individual, and society.

8. Demonstrate an understanding of the three major areas of concern in Health Related Technology.

    -Prevention
    - Diagnosis
    -Treatment

9. Demonstrate an understanding of the technological systems that could be used in the Health Related Technology area being studied.

10. Demonstrate an understanding of the effects that Health Related Technology has on bio-technologies.

11. Explain the techniques involved in the two principal programs of disease/illness prevention (immunization and educational information programs).

12. Demonstrate an understanding of the systems of the human body that allow diagnosis of disease.

    - Respiratory
    - Circulatory
    - Muscular
    - Nervous
    - Digestive
    - Excretory
    - Endocrine
    - Reproductive

LEVEL II

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	13. Identify the different technologies used in health monitoring. Examples: measuring blood pressure, pulse rate, respiration rate, blood composition;securing body-fat percentages
	14. Identify the different types of technologies used in conjunction with a physical examination. Examples: x-rays, other imaging technologies
	15. Identify the different types of new technologies that are used to treat diagnosed health conditions. Examples: interferon using DNA technologies, hormones and enzymes, organ transplant
	16. Identify the different types of rehabilitative technologies used to treat health conditions.
Processes	17. Understand the steps in following oral and written directions.
	18. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	19. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
	20. Describe the systems approach to trouble-shooting problems in the Health Related Technology area being studied.
Applications	21. Follow written and oral directions.

LEVEL II

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	22. Handle and/or operate safely the hardware, software, and supplies used in the Health Related Technology area being studied.
	23. Design a project whereby contact is made with one or more of the public health services to solve a community, environmental, mental health, personal health, or coordination or management function (of a health-related issue).
	24. List technological applications used in the diagnosis of health conditions. Trace the development of those technologies and explain how each has improved Health Related Technology in general.
	25. Discuss the advantages and disadvantages of the technological applications in a selected area of Health Related Technology.
	26. Design a technology-related rehabilitation program for someone with a given health condition that prevents him/her from being independent or from having his/her former health capacity.
	27. Design a model of an educational Health Related Technology prevention program that utilizes current technologies.

LEVEL II

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Plant and Animal Cultivation Technology area being studied.
	2. Research various information sources to identify career preparations in the Plant and Animal Cultivation Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Plant and Animal Cultivation Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the four areas of Plant and Animal Cultivation Technology.
	5. Describe various uses of the technologies related to the area of plant and animal production.
	6. Develop an awareness of the evolution of the technology involved in the Plant and Animal Cultivation Technology area being studied. -Historical -Contemporary -Future

LEVEL II

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Describe the implications that Plant and Animal Cultivation Technology has on the economy, environment, individual, and society.
	8. Demonstrate an understanding of the technological systems used in the Plant and Animal Cultivation Technology area being studied.
	9. Demonstrate an understanding of the use of genetics in Plant and Animal Cultivation Technology.
	10. Demonstrate an understanding of the effects that natural phenomena have on Plant and Animal Cultivation Technology.
	11. Demonstrate an understanding of the three major areas of technological influence on Plant and Animal Cultivation Technology. - Physical production (mechanization and natural methods) - Chemical production (fertilization and feed applications) - Nutritional production (hybridoma technology to increase health of plants and animals through environment, resources, and treatment of diseases and other problems)
	12. Identify the seven bio-related technological activities involved in the production processes for plants and animals. - Propagating - Growing - Maintaining - Harvesting - Adapting - Treating - Converting and processing

LEVEL II

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	13. Identify and give examples of pest control. - Natural - Artificial
	14. Define resource management and explain the need for it.
Processes	15. Understand the steps in following oral and written directions.
	16. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	17. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
Applications	18. Follow written and oral directions.
	19. Handle and/or operate safely the hardware, software, and supplies used in the Plant and Animal Cultivation area being studied.
	20. Design a model for using a computer to track a crop from preparation of the soil to harvesting and include financial considerations.
	21. Design a model for animal cultivation.

LEVEL II

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Waste Management Technology area being studied.
	2. Research various information sources to identify career preparations in the Waste Management Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Waste Management Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the Waste Management Technology area being studied.
	5. Describe various uses of the technologies related to the area of Waste Management Technology.
	6. Develop an awareness of the evolution of technology involved in the area of Waste Management Technology. -Historical -Contemporary -Future

LEVEL II

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Describe the implications that Waste Management Technology has on the economy, environment, individual, and society.
	8. Demonstrate an understanding of the chemical and biological processing systems used in the area of Waste Management Technology.
	9. Demonstrate an understanding of recycling systems that could be used in Waste Management Technology.
	10. Demonstrate an understanding of the effects that Waste Management Technology has on bio-technologies.
	11. Explain the principles of the various types of Waste Management Technology and treatment. - Solid waste - Sewage - Hazardous waste - Recycling
	12. Demonstrate an understanding of the different systems that have been used and are being developed for use in solid Waste Management Technology.
	13. Identify and define the functions of the environmental protection agency (EPA).
	14. Identify the different types of recycling used in waste reduction.
	15. Identify the different types and sources of waste in a sewer system.
	16. Identify some of the different alternative methods of sewage treatment that may be used in the future.

LEVEL II

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Processes	17. Understand the steps in following oral and written directions.
	18. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	19. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
	20. Describe the systems approach to trouble-shooting problems in the area of Waste Management Technology.
	21. Describe some hazardous wastes that may exist at home and describe the proper ways to treat these wastes.
	22. Describe the various ways a family can recycle waste at home.
	23. Describe and discuss some of the benefits of recycling.
Applications	24. Follow written and oral directions.
	25. Handle and/or operate safely the hardware, software, and supplies used in the Waste Management Technology area being studied.
	26. Collect litter and analyze it to identify categories and sources of soil and /or other types of pollution.
	27. Use a city map to identify and label by type waste-treatment facilities.
	28. Develop a plan for landfill remediation.
	29. Design and build a model of a mode of Waste Management Technology.

LEVEL II

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Human Factors Engineering Technology area being studied.
	2. Research various information sources to identify career preparations in the Human Factors Engineering Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Human Factors Engineering Technology ara being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the four areas of Human Factors Engineering Technology.
	5. Describe various uses of the technologies related to the Human Factors Engineering Technology area being studied.
	6. Develop an awareness of the evolution of the technology involved in the Human Factors Engineering Technology area being studied. -Historical -Contemporary -Future

LEVEL II

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Describe the implications that Human Factors Engineering Technology has on the economy, environment, individual, and society.
	8. Demonstrate an understanding of the electronic systems used in the areas of Human Factors Engineering Technology.
	9. Demonstrate an understanding of ergonomic design systems that could be used in Human Factors Engineering Technology.
	10. Demonstrate an understanding of the effects that Human Factors Engineering Technology has on biotechnologies.
	11. Explain the principles involved in time-and-motion studies.
	12. Demonstrate an understanding of the four different considerations utilized in the human factors design process. - Equipment is as good as the operator. - People operate equipment in response to design of equipment. - Equipment design must take in account body characteristics. - It is easier to modify equipment to match humans than vice versa.
	13. Explain the systems approach in the design process.
	14. Identify the three different classifications of Human Factors Engineering Technology. - Protection - Physical enhancement - Personal health

LEVEL II

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will
Concepts (continued)	15. Identify the three main areas of protection design. - Medical - Physical - Environmental
	16. Define and give examples of Human Factors Engineering Technology.
	17. Identify the primary areas incorporated in personal health applications of Human Factors Engineering. - Biofeedback - Human physiological monitoring - Enabling
Processes	18. Understand the steps in following oral and written directions.
	19. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	20. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
	21. Describe the systems approach to trouble-shooting problems in the areas of Human Factors Engineering Technology.
	22. Apply the design process to determine new methods of performing biofeedback operations.
	23. Visit all areas of the school; list and describe the ways enabling the disadvantaged is used in your building. Examples: lifts, ramps, braille indicators

LEVEL II

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Applications	24. Follow written and oral directions.
	25. Handle and/or operate safely the hardware, software, and supplies used in the Human Factors Engineering Technology area being studied.
	26. Identify and record their personal physical dimensions.
	27. Compare the record compiled in Content Standard 26 with students in the class and describe problems in designing a product for the wide range of human sizes.

LEVEL II

Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Compare a variety of careers accessible through the Fuel and Chemical Production Technology area being studied.
	2. Research various information sources to identify career preparations in the Fuel and Chemical Production Technology area being studied. - Opportunities - Benefits - Levels - Types
	3. Develop and demonstrate interpersonal and employability skills related to the Fuel and Chemical Production Technology area being studied. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Demonstrate an understanding of the terminology associated with the areas of Fuel and Chemical Production Technology.
	5. Describe various uses of the technologies related to the Fuel and Chemical Production Technology area being studied.
	6. Develop an awareness of the evolution of technology involved in the Fuel and Chemical Production Technology area being studied. -Historical -Contemporary -Future

LEVEL II

Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	7. Describe the implications that Fuel and Chemical Production Technology has on the economy, environment, individual, and society.
	8. Demonstrate an understanding of the two systems of energy production. - Renewable - Non-renewable
	9. Demonstrate an understanding of alternative forms of energy that could be used in Fuel and Chemical Production Technology.
	10. Demonstrate an understanding of the effects that fuel and chemical production has on biotechnologies.
	11. Explain the principles of biomass utilization.
	12. Demonstrate an understanding of biomass generation, biomass conversion, and biochemical conversion.
	13. Identify the principles involved in attaining energy balances. Examples: supply and demand, cost and amount of energy consumed to harness an energy source
	14. Identify the different technologies chemists are researching to find new ways to produce chemicals.
Processes	15. Understand the steps in following oral and written directions.
	16. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.

LEVEL II

Bio-Related Technologies

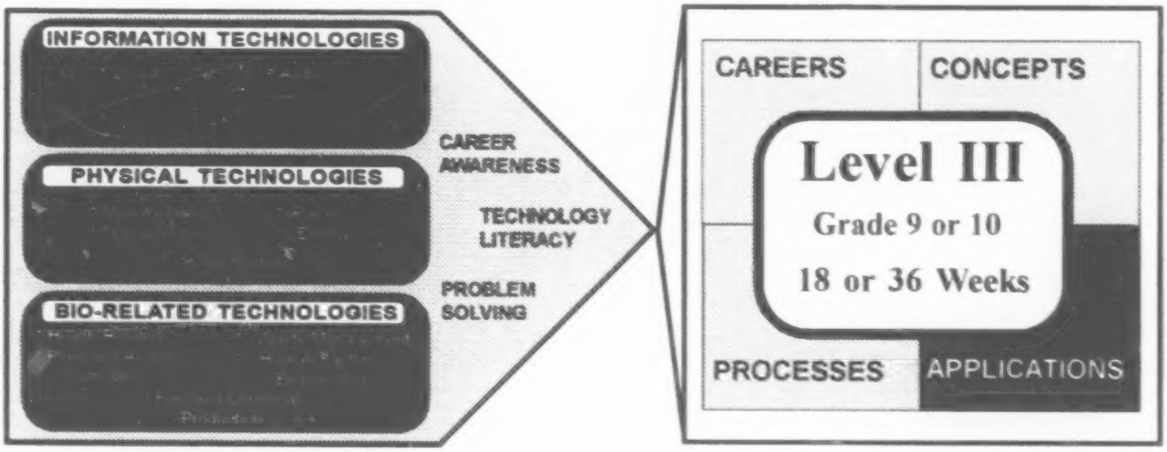
FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	17. Demonstrate the ability to follow steps necessary to complete a given task as assigned.
	18. Describe the systems approach to trouble-shooting problems in Fuel and Chemical Production Technology area being studied.
	19. Identify the different types of processes used in the chemical industry to create chemicals from biomass.
	20. Describe the two basic methods of biomass conversion. - Thermochemical - Biochemical
	21. Describe the various types of chemicals produced from biomass conversion.
	22. Describe and discuss how the combined chemical, biological, and electronic technologies are being used in the fuel and chemical production areas.
Applications	23. Follow written and oral directions.
	24. Handle and/or operate safely the hardware, software, and supplies used in the Fuel and Chemical Production Technology area being studied.
	25. Assemble a distillation apparatus, distill a mixture of alcohols, and relate this process to large-scale distillation of petroleum.
	26. Design, construct, and test a generator that uses biomass to generate a fuel.

ALABAMA TECHNOLOGY EDUCATION

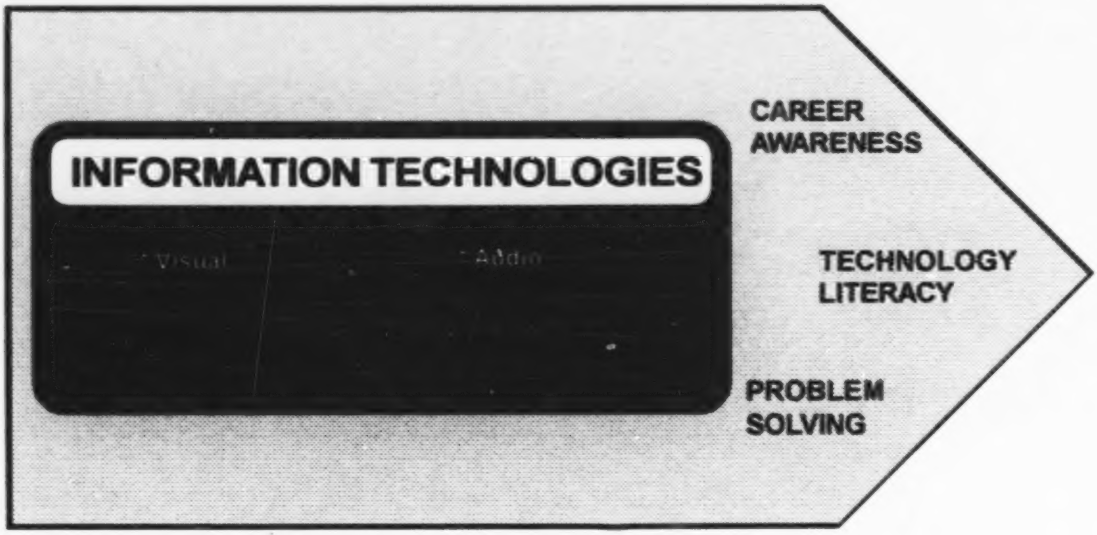
Content Standards for: LEVEL III

Narrative: Content standards for Level III place emphasis on the *applications* that are inherent within the three technological areas of studies: Information Technologies, Physical Technologies,and Bio-Related Technologies. Time should be dedicated equally to all three technological content areas. Level III is for Grade 9 or 10 and requires the student to apply the information gained in Levels I and II to multifaceted problem-solving situations by utilizing a variety of technologies. The student will spend 18 to 36 weeks at Level III. This study emphasizing *applications* is to be supported with appropriate activities for all three areas of technology. The Technology Student Association (TSA) shall be an integral part of the instructional program, and activities of the association are defined as part of the curriculum in accordance with State Department policies.The examples given in the content standards are for consistency. They are not intended to limit the scope of the applications being studied.


INFORMATION TECHNOLOGIES
PHYSICAL TECHNOLOGIES
BIO-RELATED TECHNOLOGIES
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING
CAREERS
CONCEPTS
Level III
Grade 9 or 10
18 or 36 Weeks
PROCESSES
APPLICATIONS

ALABAMA TECHNOLOGY EDUCATION

INFORMATION TECHNOLOGIES - process of gathering, manipulating, and disseminating information from one source to another


INFORMATION TECHNOLOGIES
Visual
Audio
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Information Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Animation
Desktop Publishing
Fiber Optics
Photography
Radio Broadcasting
Virtual Reality
Automated Communications
Digital Communication
Information Highway
Precision Measurement
Sign-making
Computer-Aided Design
Drafting
Lasers
Programmable Logic Control
Video Production

LEVEL III

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in Visual Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Visual Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Visual Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Visual Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the Visual Technology area being studied.
	6. Select a type of Visual Technology based on the limitation of that technology as it is applied to a problem-solving situation.
	7. Utilize design principles related to the Visual Technology area being studied as they are applied to a problem-solving situation.
	8. Select a type of Visual Technology based on the economic advantages of that technology as the type is applied to a problem-solving situation.
	9. Analyze how related technologies evolved to form the current Visual Technology area being studied.

LEVEL III

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	10. Compare and contrast how the Visual Technology area being studied impacts upon the economy, environment, individual, and society.
Processes	11. Demonstrate a knowledge of the relationship among the various components involved in problem solving.
	12. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
	13. Demonstrate the layout process for the Visual Technology area being studied.
	14. Analyze the production process for the Visual Technology area being studied. - Preproduction - Production - Postproduction
	15. Evaluate the different economical advantages of the Visual Technology area being studied.
Applications	16. Utilize written and oral directions to develop solutions to mulitfaceted problems.
	17. Handle and/or operate safely the hardware, software, and supplies used in the Visual Technology area being studied.
	18. Demonstrate an ability to complete a given task using multiple technological areas.

LEVEL III

Information Technologies

VISUAL

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	19. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Visual Technology problem by working as an individual or as a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.

LEVEL III

Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Audio Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Audio Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Audio Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Audio Technology area being studied.
	5. Develop an awareness of the ties between various related technologies associated with the Audio Technology area being studied.
	6. Analyze how related technologies evolved to form the current Audio Technology area being studied.
	7. Compare and contrast how the Audio Technology area being studied impacts upon the economy, environment, individual, and society.
	8. Select a type of Audio Technology based on the limitation of that technology as it is applied to a problem-solving situation.
	9. Utilize design principles related to the Audio Technology area being studied as they are applied to a problem-solving situation.
Processes	10. Demonstrate a knowledge of the relationship among the various components involved in problem solving.

LEVEL III

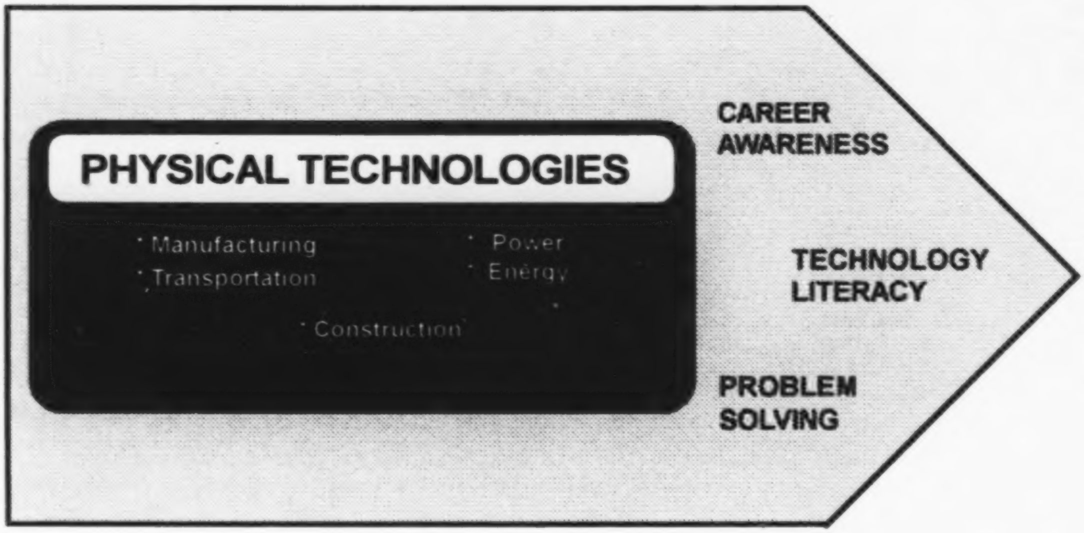
Information Technologies

AUDIO

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	11. Select a type of Audio Technology based on the economic advantages of that technology as applied to a problem-solving situation.
	12. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
Applications	13. Utilize written and oral directions to develop solutions to multifaceted problems.
	14. Analyze the production process for the Audio Technology area being studied. - Preproduction - Production - Postproduction
	15. Demonstrate the layout process for the Audio Technology area being studied.
	16. Handle and/or operate safely the hardware, software, and supplies used in the Audio Technology area being studied.
	17. Demonstrate an ability to complete a given task using multiple technological areas.
	18. Utilize Information Technologies, Physical Technologies, and Bio-Related Technologies to develop a solution to a given Audio Technology problem by working as an individual or as a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.

ALABAMA TECHNOLOGY EDUCATION

PHYSICAL TECHNOLOGIES - the process of manipulating, controlling, and re-configuring the physical and material properties of matter and energy and the technologies associated with those properties


PHYSICAL TECHNOLOGIES
· Manufacturing
· Transportation
· Power
· Energy
· Construction
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Physical Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18-or 36-week courses.

Aerospace
Computer-Aided Manufacturing
Computer Construction
Computer-Integrated Manufacturing
Computer Numerical Control
Construction
Electricity
Flight Systems
Fluids
Internal Combustion Technology
Material Handling Technology
Material Processes
Mechanics
Packaging Technology
Plastics Technology
Propulsion Systems Technology
Research & Design
Robotics
Structural Engineering
Transportation

LEVEL III

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Manufacturing Technology area being studied that utilize multiple technologies. 2. Research for additional information pertaining to understanding the career possibilities available in the Manufacturing Technology area being studied. 3. Develop further and demonstrate interpersonal employability skills related to the areas of Manufacturing Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Manufacturing Technology area being studied. 5. Develop an awareness of the ties among various related technologies associated with Manufacturing Technology. 6. Analyze how related technologies evolved to form the current Manufacturing Technology area being studied. 7. Compare and contrast how the Manufacturing Technology area being studied impacts upon the economy, environment, individual, and society.
Processes	8. Demonstrate a knowledge of the relationship of the various components involved in problem solving. - Identify the problem. - Explore ideas. - Select best idea. - Test idea. - Evaluate results.

LEVEL III

Physical Technologies

MANUFACTURING

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	9. Identify different methods used to implement quality control into the manufacturing process.
	10. Develop a bill of materials for a given manufacturing product. - Types of materials needed - Quantity of materials needed - Sizes of materials needed - Cost of materials needed - Suggested retail cost
	11. Develop a production flow chart for a given manufactured product.
	12. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
Applications	13. Utilize written and oral directions to develop solutions to multifaceted problems.
	14. Handle and/or operate safely the hardware, software, and supplies used in the Manufacturing Technology area being studied.
	15. Utilize Information Technologies, Physical Technologies, and Bio-Related Technologies to develop a solution to a given Manufacturing Technology problem by working as an individual or as a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.

LEVEL III

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Transportation Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Transportation Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Transportation Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Transportation Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the Transportation Technology area being studied.
	6. Analyze how related technologies evolved to form the current Transportation Technology area being studied.
	7. Compare and contrast how the Transportation Technology area being studied impacts upon the economy, environment, individual, and society.

LEVEL III

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	8. Discuss the advantages and disadvantages of various modes of Transportation Technology. - Aquatic - Space - Terrestrial - Atmospheric
	9. Describe the principles of navigation.
	10. Describe and discuss the general elements of physics in relation to the Transportation Technology area being studied. Examples: atmospheric - aerodynamics forces; terrestrial - rolling friction, traction; aquatic - cavitation, currents; space - weightlessness
Processes	11. Describe and discuss the general engineering processes used in wind tunnel research.
	12. Describe and discuss the various methods of controlling vehicles.
	13. Describe and discuss two ways of producing lift.
	14. Describe and discuss the characteristics of weight, lift, drag, and thrust and the effect they have on the Transportation Technology area being studied.
Applications	15. Apply skills of communication, mathematics, and science appropriate to technological content and learning activities.
	16. Conduct a research and experimentation project relating to the Transportation Technology area being studied.
	17. Utilize written and oral directions to develop solutions to multifaceted problems relating to the Transportation Technology area being studied.

LEVEL III

Physical Technologies

TRANSPORTATION

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	18. Handle and/or operate safely the hardware, software, and supplies used in the study of Transporation Technology.
	19. Utilize Information Technologies, Physical Technologies, and Bio-Related Technologies to develop a solution to a given Transportation Technology problem by working as an individual or a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate Examples: use a map legend to identify specific map and landmark characteristics; build and operate a model wind tunnel to test different designs of Transportation Technology modes; build a model of the Transportation Technology mode being studied

LEVEL III

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the PowerTechnology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Power Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Power Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Power Technology area being studied.
	5. Develop an awareness of the ties among technologies associated with the PowerTechnology area being studied.
	6. Analyze how related technologies evolved to form the current Power Technology area being studied.
	7. Compare and contrast how the Power Technology area being studied impacts upon the economy, environment, individual, and society.

LEVEL III

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Processes	8. Demonstrate a knowledge of the relationship of the various components involved in problem solving.
	9. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
Applications	10. Utilize written and oral directions to develop solutions to multifaceted problems.
	11. Handle and/or operate safely the hardware, software, and supplies used in the Power Technology area being studied.
	12. Utilize Information Technologies, Physical Technologies, and Bio-Related Technologies to develop a solution to a given power problem by working as an individual or a team member. - Plan. - Design. - Document. - Produce. - Evaluate.
	13. Conduct a research and experimentation project on a Power Technology system. - Identify problem. - State need. - Form a hypothesis. - Plan procedure. - Conduct research. - Present research. - State conclusion.
	14. Work as a member of a team to develop a solution to a given problem in Power Technology utilizing multiple technological areas.

LEVEL III

Physical Technologies

POWER

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	15. Utilize multiple technologies from all three technological areas to develop a solution to a given problem within an area of Power Technology. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.

LEVEL III

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Energy Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Energy Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Energy Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Energy Technology area being studied.
	5. Develop an awareness of the ties among technologies associated with the Energy Technology area being studied.
	6. Analyze how related technologies evolved to form the current Energy Technology area being studied.
	7. Compare and contrast how the Energy Technology area being studied impacts upon the economy, environment, individual, and society.
Processes	8. Demonstrate a knowledge of the relationship of the various components involved in problem solving.

LEVEL III

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	9. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
Applications	10. Utilize written and oral directions to develop solutions to multifaceted problems .
	11. Handle and/or operate safely the hardware, software, and supplies used in the Energy Technology area being studied.
	12. Utilize Information Technologies, Physical Technologies, and Bio-Related Technologies to develop a solution to a given Energy Technology problem by working as an individual or a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.
	13. Conduct a research and experimentation project on an Energy Technology system. - Identify problem. - State need. - Form a hypothesis. - Plan procedure. - Conduct research. - Present research. - State conclusion.
	14. Work as a member of a team to develop a solution to a given problem in Energy Technology utilizing multiple technological areas.

LEVEL III

Physical Technologies

ENERGY

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	15. Utilize multipleTechnologies from all three technological areas to develop a solution to a given problem within an area of Energy Technology. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate.

LEVEL III

Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Construction Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Construction Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Construction Technology. - Work ethics - Work quality - Safe work practices - Leadership skills
Concepts	4. Utilize the proper terminology associated with the Construction Technology area being studied.
	5. Develop an awareness of the connection among technologies associated with the Construction Technology area being studied.
	6. Analyze how related technologies evolved to form the current Construction Technology area being studied.
	7. Compare and contrast how the Construction Technology area being studied impacts upon the economy, environment, individual, and society.
Processes	8. Demonstrate a knowledge of the relationship of the various components involved in problem solving.

LEVEL III

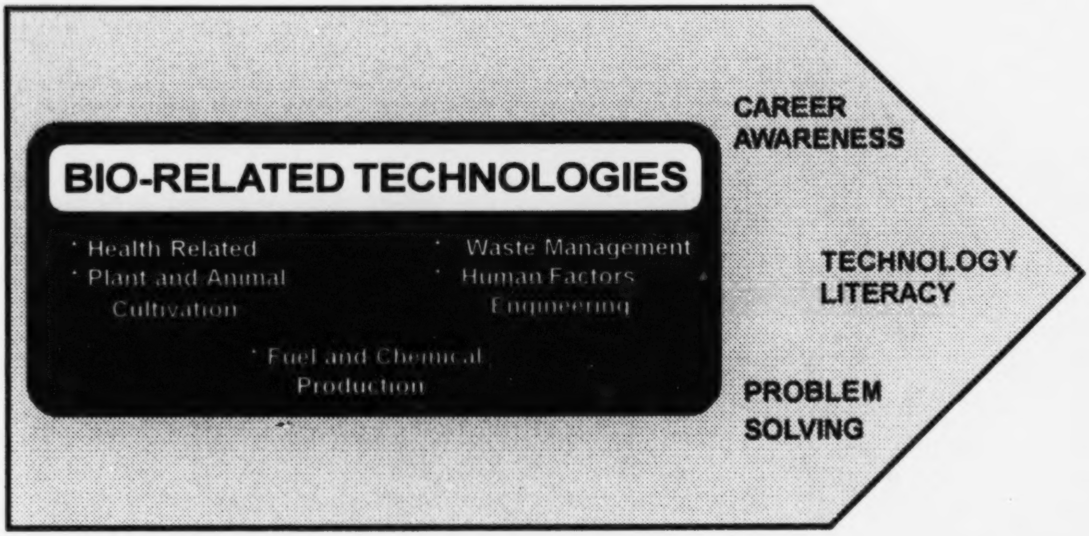
Physical Technologies

CONSTRUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Processes (continued)	9. Demonstrate the knowledge to handle and/or operate hardware, software, and supplies safely.
Applications	10. Utilize written and oral directions to develop solutions to multifaceted problems.
	11. Handle and/or operate safely the hardware, software, and supplies used in the Construction Technology area being studied.
	12. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Construction Technology problem by working as an individual or a team member. - Plan. - Design. - Document. - Produce. - Package. - Market. - Evaluate. Example: design and build a structure utilizing the following systems: energy, fluid, ergonomics, ecological, safety, finishing, engineering

ALABAMA TECHNOLOGY EDUCATION

BIO-RELATED TECHNOLOGIES - the practical application of mechanical devices, products, substances, or organisms to improve health or contribute to the harmony between humans and their environment


BIO-RELATED TECHNOLOGIES
Health Related
Plant and Animal Cultivation
Waste Management
Human Factors Engineering
Fuel and Chemical Production
CAREER AWARENESS
TECHNOLOGY LITERACY
PROBLEM SOLVING

The list below includes topics that would fit within the areas identified under the *Bio-Related Technologies*. As new and related topics emerge, they may be added to the appropriate areas. At no time are these individual topics to be treated as stand-alone 18- or 36-week courses.

Alternate Energies
Human Factors Engineering
Meteorology
Aquaponics
Hydroponics
Waste Management
Biotechnology Engineering
Medical Technology

LEVEL III

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Health Related Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Health Related Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Health Related Technology. -Work ethics -Work quality -Safe work practices -Leadership skills
Concepts	4. Utilize the proper terminology associated with the Health Related Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the area of Health Related Technology.
	6. Analyze how related technologies evolved to form the current Health Related Technology area being studied.
	7. Compare and contrast how the Health Related Technology area being studied impacts upon the economy, environment, individual, and society.
	8. Discuss the advantages and disadvantages of the various methods of technologies used to diagnose a health condition.

LEVEL III

Bio-Related Technologies

HEALTH RELATED

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	9. Discuss and describe the methods and technology of immunization as a preventive measure in Health Care Technology.
Processes	10. Describe and discuss the processes involved in recombinant DNA technologies and the way they apply to Health Related Technology.
	11. Describe and discuss the relationship between genetics and organ transplantation.
	12. Describe and discuss the various technologies developed for other purposes that have applications in medical technology.
	13. Define and discuss rehabilitation technology.
Applications	14. Apply skills of communication, mathematics, and science appropriate to technological content and learning activities.
	15. Conduct a research and experimentation project related to Health Related Technology.
	16. Utilize written and oral directions to develop solutions to multifaceted problems related to Health Related Technology.
	17. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Health Related Technology problem by working as an individual or a team member.

LEVEL III

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Plant and Animal Cultivation Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Plant and Animal Cultivation Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Plant and Animal Cultivation Technology. -Work ethics -Work quality -Safe work practices -Leadership skills
Concepts	4. Utilize the proper terminology associated with the Plant and Animal Cultivation Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the areas of Plant and Animal Cultivation Technology.
	6. Analyze how related technologies evolved to form the current Plant and Animal Cultivation Technology area being studied.
	7. Compare and contrast how the Plant and Animal Cultivation Technology area being studied impacts upon the economy, environment, individual, and society.
	8. Discuss the advantages and disadvantages of the impact that technology has had on Plant and Animal Cultivation Technology over the past several thousand years.

LEVEL III

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	9. Describe the principal production processes.
	10. Describe and discuss the physiological needs of humans and the way Plant and Animal Cultivation Technology satisfies those needs.
Processes	11. Describe and discuss the processes used in the propagation of plants and animals.
	12. Describe and discuss the processes used in the growing of plants and animals.
	13. Describe and discuss the processes in maintaining environments in the cultivation of plants and animals.
	14. Describe and discuss the processes involved in the harvesting of plants and animals.
	15. Describe and discuss the processes involving technology in the cultivation of plants and animals.
	16. Describe and discuss the methods involved in the treating processes of Plant and Animal Cultivation Technology.
Applications	17. Apply skills of communication, mathematics, and science appropriate to technological content and learning activities.
	18. Conduct a research and experimentation project related to Plant and Animal Cultivation Technology.

LEVEL III

Bio-Related Technologies

PLANT & ANIMAL CULTIVATION

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	19. Design and build a model for an alternative method of growing food. Example: hydroponics greenhouse
	20. Conduct pH tests on various soil types.
	21. Utilize written and oral directions to develop solutions to multifaceted problems related to Plant and Animal Cultivation Technology.
	22. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Plant and Animal Cultivation Technology problem by working as an individual or a team.

LEVEL III

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Waste Management Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Waste Management Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Waste Management Technology. -Work ethics -Work quality -Safe work practices -Leadership skills
Concepts	4. Utilize the proper terminology associated with the Waste Management Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the area of Waste Management Technology.
	6. Analyze how related technologies evolved to form the current Waste Management Technology area being studied.
	7. Compare and contrast how the Waste Management Technology area being studied impacts upon the economy, environment, individual, and society
	8. Discuss the advantages and disadvantages of various methods of solid waste management.

LEVEL III

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued)	9. Describe the principles of hazardous waste treatment and management.
	10. Describe and discuss the Resource Conservation and Recovery Act.
Processes	11. Describe and discuss the differences in chemical wastes and mine runoff.
	12. Describe and discuss the various methods of controlling hazardous wastes.
	13. Describe and discuss ways the public is warned of the presence of and the transport of hazardous wastes.
	14. Describe and discuss the labeling system used by DOT in providing guidelines for emergency personnel.
Applications	15. Apply skills of communication, mathematics, and science appropriate to technological content and learning activities.
	16. Conduct a research and experimentation project related to Waste Management Technology.
	17. Visit a local landfill to observe common waste disposal methods.
	18. Bring soil samples from home for analysis. Bring one from an area that grows plants well and another from a poor cultivation area. Analyze and compare samples for different characteristics.
	19. Design a program for remediation of the results of the analysis done in Content Standard 18.

LEVEL III

Bio-Related Technologies

WASTE MANAGEMENT

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	20. Utilize written and oral directions to develop solutions to multifaceted problems related to Waste Management Technology.
	21. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Waste Management Technology problem by working as an individual or a team member.

LEVEL III

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Human Factors Engineering Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Human Factors Engineering Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Human Factors Engineering Technology. -Work ethics -Work quality -Safe work practices -Leadership skills
Concepts	4. Utilize the proper terminology associated with the Human Factors Engineering Technology area being studied.
	5. Develop an awareness of the ties between various related technologies associated with the area of Human Factors Engineering Technology.
	6. Analyze how related technologies evolved to form the current Human Factors Engineering Technology area being studied.
	7. Compare and contrast how the Human Factors Engineering Technology area being studied impacts upon the economy, environment, individual, and society.
	8. Discuss the principles to be considered in equipment design.
	9. Describe the principles to be considered in environmental design.
	10. Describe the principles to be considered in task design.

LEVEL III

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Concepts (continued) **Processes**	11. Describe the principles to be considered in personnel design.
	12. Describe and discuss the various considerations used in the design process.
	13. Describe and discuss the systems approach in the design process.
	14. Describe and discuss the three classifications of Human Factors Engineering Technology that are used in bio-related technologies. - Protection - Physical enhancement - Personal health application
Applications	15. Apply basic skills of communication, mathematics, and science appropriate to technological content and learning activities.
	16. Conduct a research and experimentation project related to Human Factors Engineering Technology.
	17. Design, build, and operate a model of a selected product to meet students' own physical requirements.
	18. Identify a design problem in an available product and design a solution to the problem, taking all the design processes into consideration; construct a model.
	19. Utilize written and oral directions to develop solutions to multifaceted problems related to Human Factors Engineering Technology.

LEVEL III

Bio-Related Technologies

HUMAN FACTORS ENGINEERING

STRANDS	CONTENT STANDARDS
	Students will:
Applications (continued)	20. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given problem by working as an individual or a team member.

LEVEL III

Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Careers	1. Identify careers in the Fuel and Chemical Production Technology area being studied that utilize multiple technologies.
	2. Research for additional information pertaining to understanding the career possibilities available in the Fuel and Chemical Production Technology area being studied.
	3. Develop further and demonstrate interpersonal employability skills related to the areas of Fuel and Chemical Production Technology. -Work ethics -Work quality -Safe work practices -Leadership skills
Concepts	4. Utilize the proper terminology associated with the Fuel and Chemical Production Technology area being studied.
	5. Develop an awareness of the ties among various related technologies associated with the areas of Fuel and Chemical Production Technology.
	6. Analyze how related technologies evolved to form the current Fuel and Chemical Production Technology area being studied.
	7. Compare and contrast how the Fuel and Chemical Production Technologies area being studied impacts upon the economy, environment, individual, and society.
	8. Discuss the advantages and disadvantages of various methods of thermochemical conversion.
	9. Discuss the advantages and disadvantages of various methods of biochemical conversion.

LEVEL III

Bio-Related Technologies

FUEL AND CHEMICAL PRODUCTION

STRANDS	CONTENT STANDARDS
	Students will:
Processes	10. Describe the principles of thermochemical and biochemical conversion.
	11. Describe and discuss the general engineering processes used in manufacturing chemicals from biomass.
Applications	12. Apply skills of communication, mathematics, and science appropriate to technological content and learning activities.
	13. Conduct a research and experimentation project related to Fuel and Chemical Production Technology.
	14. Design, build, and operate a model of biomass conversion using thermochemical conversion.
	15. Design, build, and operate a model of biomass conversion using biochemical conversion.
	16. Utilize written and oral directions to develop solutions to multifaceted problems relating to Fuel and Chemical Production Technology.
	17. Utilize Information Technology, Physical Technology, and Bio-Related Technology to develop a solution to a given Fuel and Chemical Production Technology problem by working as an individual or a team member.

APPENDIX A

DIPLOMA REQUIREMENTS

Effective for students who begin the ninth grade in the 1996-97 school year, in order to earn an Alabama high school diploma, students must successfully complete the High School Basic Skills Exit Exam and earn the requirements for the Alabama High School Diploma or the Alabama High School Diploma with Advanced Academic Endorsement. A local board of education may establish requirements for receipt of additional endorsements, but any endorsement must include those requirements for the Alabama High school diploma.

Alabama High School Diploma

		Credits
English Language Arts		4
Four credits to include the equivalent of:		
English 9	1	
English 10	1	
English 11	1	
English 12	1	
Mathematics		4
Four credits to include the equivalent of:		
Algebra I	1	
Geometry	1	
Science		4
Four credits to include the equivalent of:		
Biology	1	
A Physical Science	1	
Social Studies		4
Four credits to include the equivalent of:		
Grade 9	1	
World History	1	
U. S. History	1	
Government	1/2	
Economics	1/2	
Physical Education		1
Health Education		1/2
Fine Arts		1/2
Computer Applications*		1/2
Electives		5 1/2
Local boards must offer foreign languages, fine arts, physical education, wellness education, vocational and technical preparation, and driver education as electives.		
TOTAL		24

*May be waived if computer literacy, keyboarding skills, and introductory applications are verified by qualified staff at the high school. The designated one-half credit will then be added to the electives, making a total of six electives.

Alabama High School Diploma with Advanced Academic Endorsement

Credit earned through applied academic courses or embedded credit situations will not satisfy the core curriculum requirements for a diploma with an advanced endorsement.

		Credits
English Language Arts		4
Must include advanced levels of:		
English 9	1	
English 10	1	
English 11	1	
English 12	1	
Mathematics		4
Must include advanced levels of:		
Algebra II with Trigonometry	1	
Science		4
Must include advanced levels of:		
Biology	1	
A Physical Science	1	
Additional Life and/or Physical Science	2	
Social Studies		4
Must include advanced levels of:		
Grade 9	1	
World History	1	
U. S. History	1	
Government	1/2	
Economics	1/2	
Physical Education		1
Health Education		1/2
Fine Arts		1/2
Computer Applications*		1/2
Foreign Language		2
Electives		3 1/2
Local boards must offer foreign languages, fine arts, physical education, wellness education, vocational and technical preparation, and driver education as electives.		
TOTAL		24

*May be waived if computer literacy, keyboarding skills, and introductory applications are verified by qualified staff at the high school. The designated one-half credit will then be added to the electives, making a total of four electives.

APPENDIX B

GUIDELINES FOR LOCAL TIME REQUIREMENTS AND HOMEWORK

In accordance with # 1.1.5 (Action Item #F-1) adopted by the Alabama State Board of Education on February 23, 1984, which directs the State Courses of Study Committee to include time-on-task requirements in the State Courses of Study, the following recommendations are made:

- Local school systems should develop time allocations that reflect a balanced school day. In addition, they should account for the law related to time requirements (§16-1-1, Ala.Code, 1975); that is, the total instructional time of each school day in all schools and at all grade levels shall not be less than 6 hours or 360 minutes, exclusive of lunch periods, recess, or time used for changing classes.

- The recommended list below resulted from considerations of a balanced educational program. Any deviations established at the local level should be accompanied by rationales that ensure balance and are compatible with the developmental characteristics of students.

NOTE: Time requirements provide a general plan and are to be implemented with a flexibility" that encourages interdisciplinary approaches to teaching.

SUBJECT AREA	GRADES 1-3	GRADES 4-6
Language Arts	150 minutes daily	120 minutes daily
Mathematics	60 minutes daily	60 minutes daily
Science	30 minutes daily	45 minutes daily
Social Studies	30 minutes daily	45 minutes daily
Physical Education	30 minutes daily*	30 minutes daily*
Health	60 minutes weekly	60 minutes weekly
Art	60 minutes weekly	60 minutes weekly
Music	60 minutes weekly	60 minutes weekly
Computer Education	60 minutes weekly	60 minutes weekly

*Established by the State Department of Education in accordance with §16-40-1 (Ala. Code, 1975)

GRADES 7-12

A minimum of 140 clock hours of instruction is required for one unit of credit. A time allotment of either 50 minutes per day or 250 minutes per week will satisfy this requirement and still allow for flexible scheduling. This requirement applies to those schools that are not accredited as well.

In those schools where Grades 7 and 8 are housed with other elementary grades, the school may choose the time requirements listed for Grades 4-6 or those listed for Grades 7-12.

REMEDIAL AND/OR ENRICHMENT ACTIVITIES

Remedial and/or enrichment activities should be a part of the time schedule for the specific subject area.

KINDERGARTEN

In accordance with *Ala. Admin. Code* r. 290-050-010.01 (4) Minimum Standards for Organizing Kindergarten Programs in Alabama Schools, the daily time schedule of the kindergartens shall be the same as the schedule of the elementary schools in the systems of which they are a part. This standard references the fact that kindergartens in Alabama operate as full-day programs.

In accordance with *Ala. Admin. Code* r. 290-050-010.02, the official guide for program planning in kindergarten is *Alabama Kindergartens*, Bulletin 1987, No. 28. Criteria to be used in scheduling are listed on pages 45-46 of this guide. These include a balance of individual exploration, small-group interest activities, interaction with peers and teachers, handling of concrete materials and many other real world experiences. The emphasis is on large blocks of time that allow children the opportunity to explore all areas of the curriculum in an unhurried manner.

HOMEWORK

Homework is a vital component of every student's instructional program. Students, teachers, and parents should have a clear understanding of the objectives to be accomplished through homework and of the role it plays in meeting requirements of a course. Homework should be meaningful and used to reinforce classroom instruction. It should not place students and parents in a position of having to study skills that have not been introduced and practiced through classroom instruction. Furthermore, students and parents should not be burdened by excessive amounts of homework.

Each local board of education shall establish a policy on homework consistent with the State Board of Education resolution adopted February 23, 1984. (Action Item #F-2)

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